INDIAN FARMING

Vol. IV New Series No. 1 April. 1954

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Printed and published by P. H. Raman at the Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7.
(Agents for Indian Council of Agricultural Research, New Delhi.)

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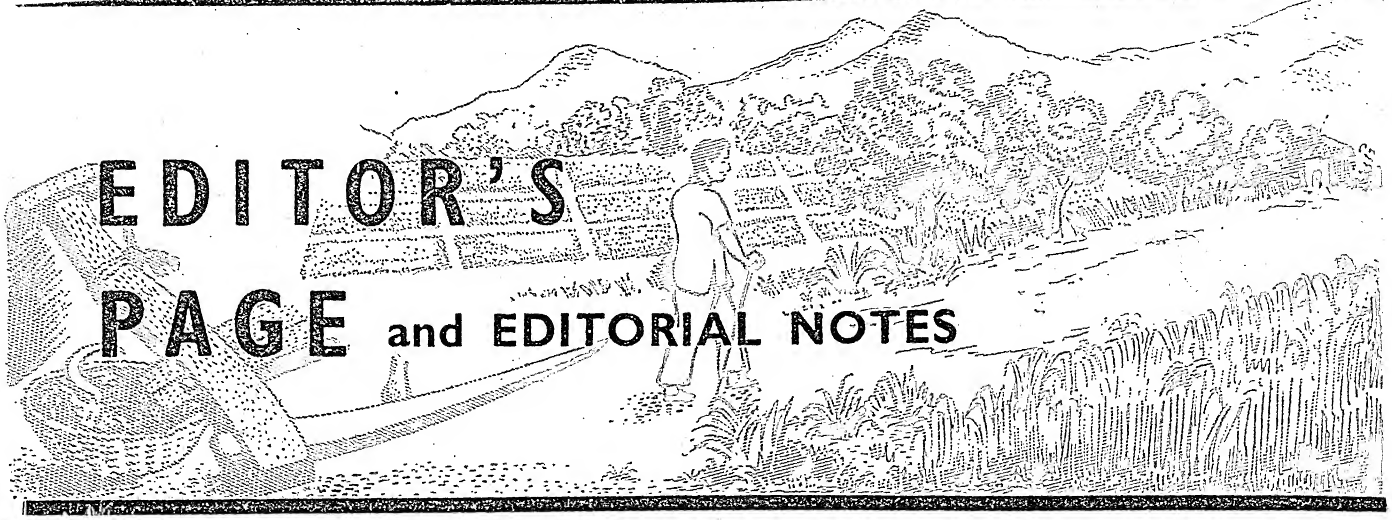

REGENERATION OF AGRICULTURE IN INDIA*

There is immense scope for better rice cultivation in India, and if we sincerely do all we can, there is no earthly reason why we should be not only self-sufficient but also be in a position to export some of our better varieties to countries, like Ceylon, which have been our traditional customers.

In my view, March 15 is a great day because it was on this day last year that we started an intensive campaign in favour of the Japanese method of paddy cultivation all over India. Today is the first anniversary of this comparatively small but epoch-making event, because by it hang my hopes of a regeneration of agriculture in India. What little we have been able to do in the course of 1953 should, I feel convinced, initiate a new epoch in the history of Indian agriculture.

A year back, it was only a venture because there were many uncertainties attached to the campaign. We were not sure how many people would co-operate, what enthusiasm we would be able to generate and what degree of success we would achieve. I am so happy to see that we have been more than satisfied in all these respects, because everywhere our expectations have been more or less realised and in many cases exceeded. Naturally enough, there were doubts about its efficacy and much more so about its applicability under varying conditions in India.

Regarding it as a mere enthusiastic scheme of Government many people were hesitant to go in for it, quite a few more had a very strong objection to the name and thought it derogatory to the antiquity and pride of Indian agriculture that we should have called it the Japanese method. After a lapse of a year, however, I can safely say that most of those who scoffed at it are now inclined to bless it because wherever they have gone the results have been so satisfactory. All the same, I thank them all for this change in their attitude. Now that we have achieved this success, I am not at all sorry that we had some critics as also a few opponents. Their persistent criticism has proved conclusively that our endeavour was severely tested but was not found wanting.

The success of the Japanese method has raised high expectations for the future. As my listeners know, we achieved these results without hardly any cost to the Central Government beyond preparation of publicity material. For want of our own films, we had to use a film produced in Japan, but we did our best to give it the largest possible publicity. This year, we are trying to tackle publicity a little more systematically. I have constituted a small committee at the Secretariat level to co-ordinate activities in the various directions. Wherever old printed material is available, it may be used for the propagation of the method, but we are producing a few new pamphlets and also hope to show films prepared in India.

April 10 and 11 have been fixed for a greater drive. Then I expect the largest number of people, including teachers, professors and social and political workers, to go into the rural areas where paddy is cultivated so that the largest number of people may know about it. In the meantime, of course, further demonstrations would be carried on.

I have more than once expressed my admiration for the help we received from the Kora Kendra people and the Gandhi Smarak Nidhi workers. They toured a large number of places last year and gave

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* Speech broadcast by Dr. Panjabrao S. Deshmukh on the first anniversary of the Janpanese method of Paddy-growing from the Delhi Station of All-India Radio. The speech is reproduced here because of its special significance.

Editor

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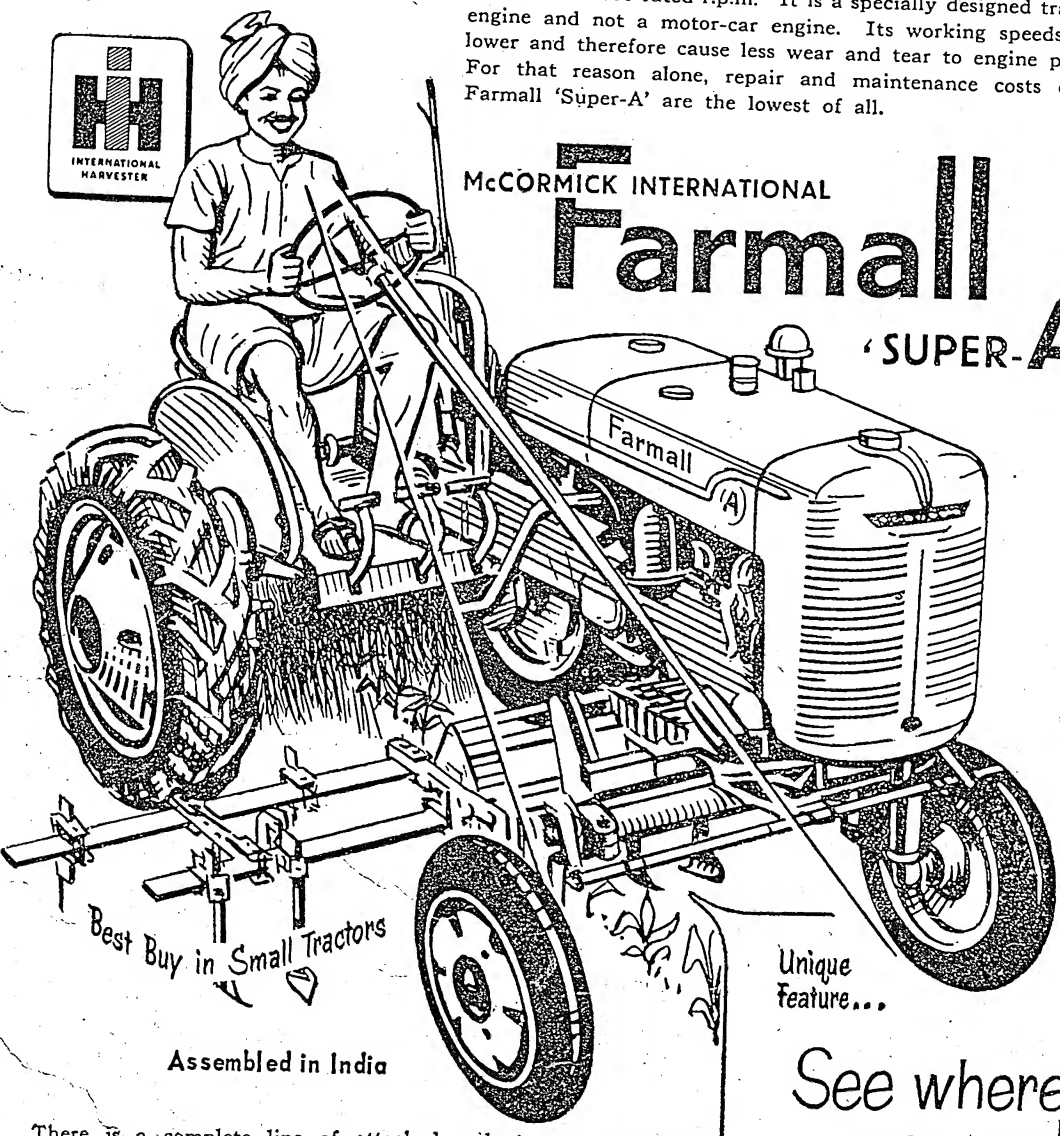

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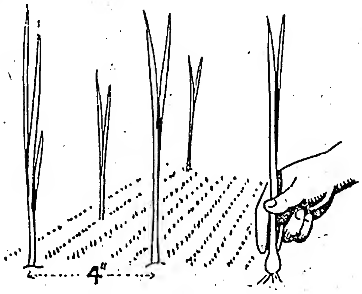
HOW TO GROW ONIONS

(*Contd. from page 30*)

2. The soil
3. The nature of planting material used, i.e., seedlings or bulbs

Onion crop planted between June and October requires only occasional irrigation. Crop planted in October requires more irrigation and the summer crop invariably requires irrigation at weekly intervals. Light soils require double the number of irrigations given in heavy soils.

The seedling crop requires light and careful irrigation till the seedlings are one month old. The first



irrigation should be given on the third day of planting and subsequent irrigations should be regulated by the moisture present in the top three inches of the soil.

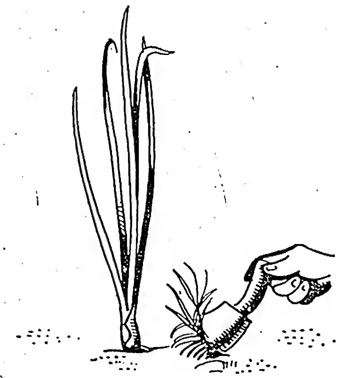
The June crop usually requires five to six irrigations, the October crop twelve to fifteen and the summer crop fifteen to twenty.

The final irrigation should be given two to three days before lifting of bulbs.

WEEDING AND INTERCULTURE

Generally speaking, the onion crop requires three to four weedings at 10 to 15 days intervals. In heavy soils hoeing is essential a week to ten days after second irrigation. The weak plants should be carefully earthed-up. During the south-west monsoon, the crop sometimes runs to rank leafy growth, and this can be prevented by trampling the crop under the feet. This operation should be carried out when the land is dry.

Bulbs begin to form about $2\frac{1}{2}$ months after planting and the necks of the bulbs are visible in large-sized varieties. These exposed portions of the bulbs should not be earthed-up as exposure to sun and air leads to better bulb development.



Flowering stalks should be nipped before the flower-heads are formed to help normal bulb development.

HARVESTING

The onion crop is generally ready for harvest about $3\frac{1}{2}$ months after planting seedlings or four months after planting bulbs. The leaves of the mature crop turn yellow from top to bottom and finally droop down.

Bulbs should be lifted carefully so as to avoid injury.

numerous demonstrations. The services of Shri Pran Nath Kapadia and Shri Harish Chandar Patel, who, in fact, brought this method to India, have been of the greatest importance. They have already started training classes and demonstrations.

As I have pointed out previously, this method, which is essentially a more scientific method of better agriculture, is, in some respects, also applicable to other crops. I am happy to say that a large number of cultivators have taken this hint and some Agriculture Departments have shown commendable enthusiasm. The result is that the success of the Japanese method in the case of paddy is also being repeated with regard to other crops with signal success.

In order that we may expand the scope of this method of better cultivation to other fields, I have proposed that May 15 should be celebrated as a day for intensive propaganda in favour of better cultivation of cotton, jute, *jowar*, maize, *bajra* as well as

(*Contd. on page 6*)

IMPORTANT ANNOUNCEMENT

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, will cease to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi—2.

Editor

CORRECTION

February, 1954 *issue of "Indian Farming"*

Page 27, points (5) and (6) under sub-heading 'Care during pregnancy'

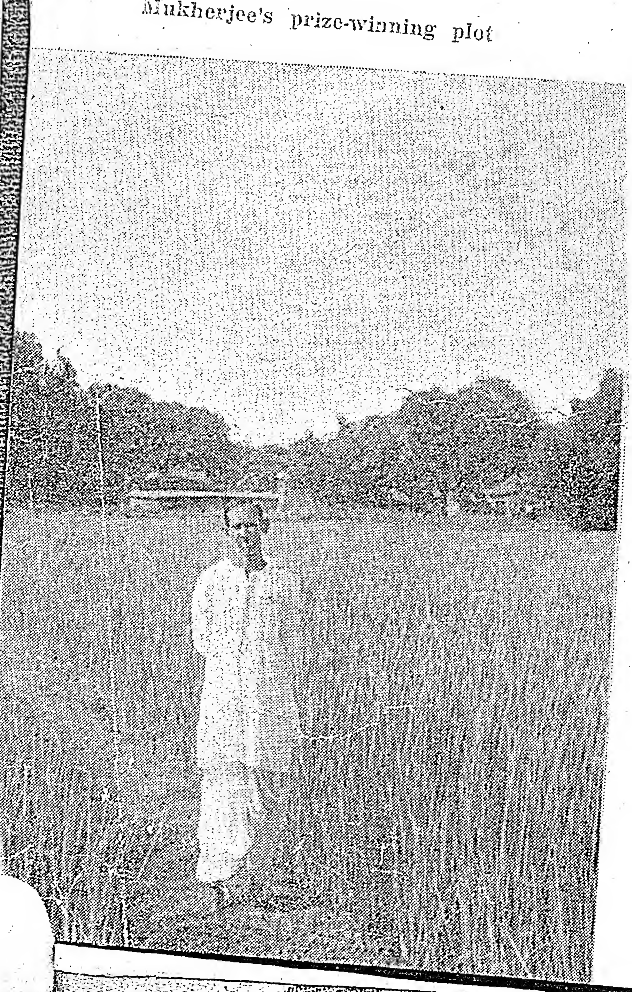
For arrived *Read* avoided.

OUR COVER

A HEAP OF HYBRID COBS.

Farmer Mukherjee

Mukherjee's prize-winning plot



MAN OF THE MONTH:

90 MAUNDS PADDY PER ACRE FROM BRICK-FIELD

By MURARI PROSAD GUHA

WE were agreeably surprised when we heard that one Shyamapada Mukherjee of village Kendua, contiguous to Suri town in West Bengal, had produced 90 maunds of paddy per acre on an exposed piece of land with red laterite soil covering superficially a murram bed. It was unbelievable that a farmer in this area could ever raise a prize-winning crop on this land.

Fifty-four at present, Mr. Mukherjee had to give up his studies, when he was in the matriculation class due to the sudden death of his father, employed as a *nazir* in the local Collectorate. Almost a lad, he had taken up service in an Estate and looked after the land entrusted to his care. The duties assigned to him enabled him to gain experience in farming methods.

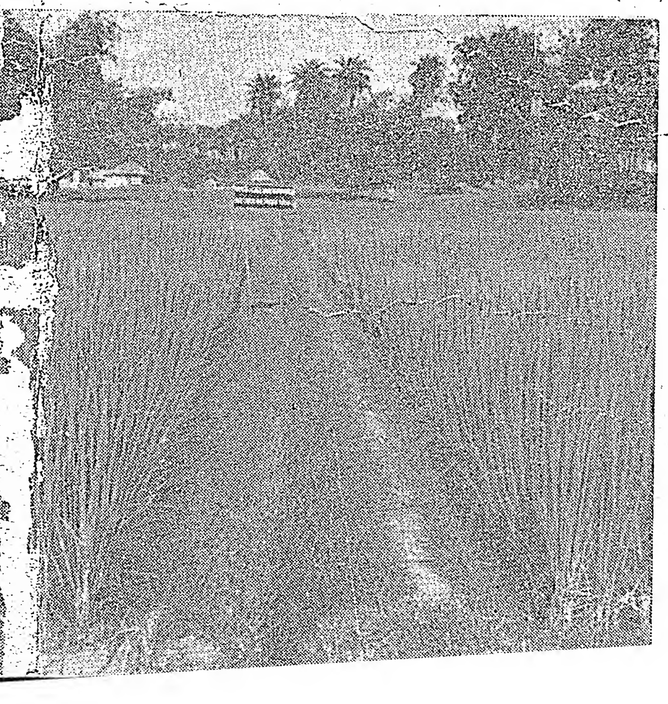
It was about 30 years ago that he purchased the 20 acres of land at present in his possession, out of which 13 acres were situated in one compact block. In this block there was previously a brick-field that had used up the top-soil and had opened up the murram bed below it. The rest of the land was full of various kinds of weeds, wild plum and dates. The land had to be supplied with fresh soil from the undulated plots elsewhere and scrapings of the five tanks that existed there. These tanks, however, are very vital to Mr. Mukherjee's farm now. Besides irrigating his lands, they yield enough fish to ensure a net revenue of about Rs. 500 per annum. The tanks never dry up and the water therein always stands six to nine feet deep.

During his long career of 30 years as a practical farmer, Mr. Mukherjee has realized the importance of using improved seeds distributed by the local rice research station. Mr. Mukherjee cultivates sugarcane and paddy followed by either wheat or potato or any other suitable vegetable. In addition to these crops, he has raised various kinds of fruit trees bordering the pathways in his well-laid out farm.

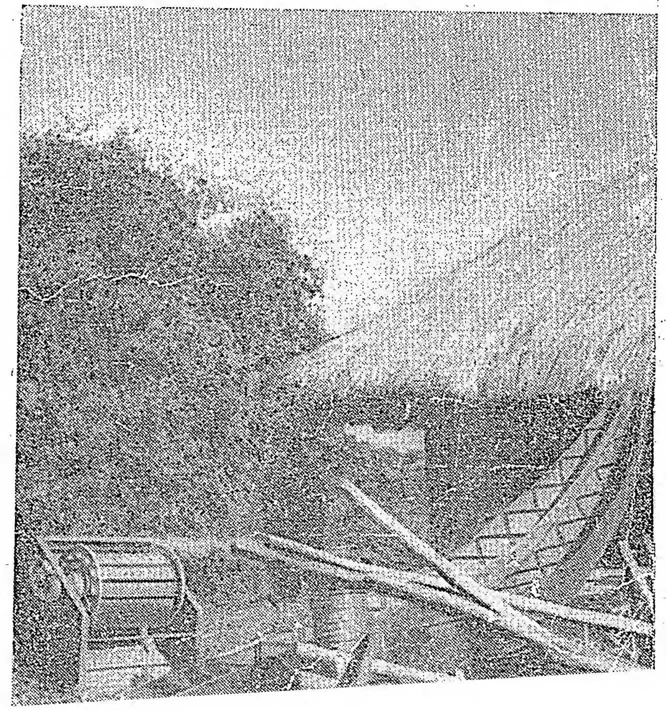
METHODS USED

After harvesting the previous crop of paddy early in January, the stubbles were burnt and two ploughings were given cross-wise to open up the land. During mid-April, 60 cartloads of tank-silt and 30 cartloads of farmyard manure were applied and the land was ploughed to mix the manure with the soil. In the middle of May, six cartloads of cow-dung manure were applied. The land was ploughed again and *sanai* was planted for green manure, the seed-rate being 60 lb. per acre. *Sanai* was ploughed in at the end of June when the plants were 3-3½ ft. high. Then the land was flooded, bunds having been constructed previously on all sides of the field. After about two weeks, the land was puddled.

Paddy crop raised by the Japanese method



Agricultural implements used by Mukherjee



o.419 variety of canes on Mukherjee's farm

In the beginning of May, a 1/8 acre plot was prepared for use as a seed-bed with an application of 10 cartloads of cow-dung and 60 lb. of bone-meal. In the middle of May, 30 lb. of paddy seed were sown in this plot. The variety of seed used was Raghusail *aman*. The seedlings thus raised were transplanted in the main field three to four days after puddling. Three to four seedlings at a distance of eight to nine inches were planted. After a fortnight, one mulching was given; a fortnight afterwards 60 lb. of sulphate of ammonia and 60 lb. of superphosphate were applied, and another mulching was given. The average number of tillers was 40 and the length of the ear-head was nine inches, with 270-280 heavy grains per ear. The crop was harvested in the presence of the Crop Competition Committee and the yield was estimated to be about 90 maunds for an acre.

GENERAL REMARKS

Mr. Mukherjee himself works along with other farmhands he employs. He has a large family of four sons and five daughters. His second son was sent to the U.S.A. by the Union Government in the International Farm Youth Exchange Scheme.

EDITOR'S PAGE

(*Contd. from page 3*)

ragi. The intention is that the Departments of Agriculture in the States should, as a result of this intensive drive, convey their advice on spacing, seed-rate and fertilizers and manures to as many cultivators as possible and persuade them to try the improved method in respect of these crops on some portion of their land. We cannot obviously be content with increased production of paddy alone; just as we want more rice, so also we want more jute, more cotton, more oilseeds and more of other foodgrains. I have also promised to tackle the question of increased sugarcane production. In order that we may leave no desirable step from being taken, I have suggested August 15 for more intensive propaganda for better cultivation of rabi crops, such as wheat, gram and oilseeds.

The reports received indicate very impressive results wherever the Japanese method has been somewhat systematically applied. Taking all the States which have reported so far together, the additional yield per acre comes to 15.7 maunds. It is significant that the additional average yield per acre in Orissa was 17 maunds, in West Bengal 19.5 maunds, in Travancore-Cochin 21.6 maunds and in Madhya Pradesh 38 maunds. If we compare them with the previous averages, we will be agreeably surprised with the most encouraging results obtained. For instance, in U. P., the output per acre after the adoption of the Japanese method has been reported to be 18 maunds, which normally used to be 5 maunds 35 seers. In the case of West Bengal, we have a report of 95 maunds per acre having been produced by the Japanese method as against the normal yield of 11 maunds. In Bombay and Madhya Bharat, it reached 120 maunds, as against the usual yield of 8 to 10 maunds. Mysore, however, reached the record yield of 144 maunds, compared to the previous output of 7 maunds 15 seers.

Last year, the Central Government offered big loans to the States for the purchase of fertilisers by the cultivators. The Central Government has also allotted a sum of Rs. 10 crores for advances as loans to the various State Governments during the current year. Sufficient advantage does not seem to have been taken of this facility, but I hope that with the popularity of the Japanese method the States will avail themselves of the loans and pass them on to the cultivators to the largest extent possible. If this is done, the complaint that the Japanese method is costly need not be there.

From the figures so far available from the various States, it is apparent that if some care is taken, the difference in the cost between the old and the new method can be very appreciably reduced. Indeed, I have met a large number of paddy cultivators who are prepared to prove that, excepting perhaps the extra cost of chemical fertilisers, there is no reason to spend more on the Japanese than on the local method.

(*Contd. on page 27*)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S. 220-X52

SEASONAL PESTS OF CROPS: THE *Anar*-BUTTERFLY, *Virachola isocrates*, FABR.

By

E. S. NARAYANAN,

Head of the Division of Entomology, I. A. R. I., New Delhi

BUTTERFLIES are well-known for their exquisite beauty and an interesting life-history. Few would, however, believe that they can be a pest of agricultural crops and orchards. Indeed there are only a few pests among butterflies and one of the most serious and destructive among them in the Indian Union is the *anar* (pomegranate) butterfly, *Virachola isocrates*. In many orchards in the Middle East a related species, *Virachola livia* Klug, sometimes infests and damages the whole crop.

Pomegranate is considered as an aristocrat among fruits in Egypt, Palestine and other Middle East countries and is popular in India for its medicinal properties. The rind of this fruit contains an acid known as gallo-tannic acid which is administered as an astringent in diarrhoea and dysentery. To the Greeks and Romans, in addition to its medicinal properties, it was also useful as a tanning material. The need for preventing or atleast reducing the damage caused by the *anar*-butterfly needs no emphasis.

V. isocrates has been reported from all the *anar*-growing areas in the Indian Union. In Pusa (Bihar) the damage caused is often high and at times the infestation may be as high as 75 per cent. In the South in Coimbatore, northern Circars, Mysore, etc. the orchardists suffer serious losses from the depredations of this pest. The author has observed infestations of the order of 90 per cent in some orchards in the Coimbatore district. The pest has also been reported from West Bengal.

Each infested fruit has generally a single caterpillar inside it which tunnels through the pulp and fills the fruit with its excreta. Thus the fruit is rendered unfit for human consumption. One or more holes may be found on the rind of the fruit and in one of these holes the anal segment of the caterpillar is visible near the surface. These holes are oftentimes plugged with the excreta of the growing caterpillar. Besides pomegranate, which is its specific host, the pest has also been reported to feed on guava, *loquat*, tamarind, orange and other wild fruits.

LIFE-HISTORY

The female moth which is violet-brown in colour, starts oviposition a couple of days after emergence and mating. The eggs are laid singly on the flowers when the fruit trees blossom. Though rarely, the eggs are also laid on the surface of the tender fruits. The egg is small, dome-shaped and shining white in colour. The minute caterpillar that hatches out of the egg crawls to that part of the fruit where the rind is soft and tender and then bores into the fruit. There it grows by feeding on the sweet pulp as well as the hard seeds. The full-grown larva is short and stout, of a dark colour with short hairs and light patches on its body. It measures about $\frac{3}{4}$ in. in length and $\frac{1}{4}$ in. in breadth. At this stage, the caterpillar comes out of the hole and, almost instinctively, secures the stalk of the fruit to the stem with a silky secretion of its own. It is presumed that this binding is done to prevent the falling of the fruit and consequent injury to the pupa inside it. This job done, it retreats into its abode and pupates. Sometimes pupation takes place on the stalk of the fruit itself. This pupa blossoms into a pretty, bluish-brown butterfly which floats in the air like a flower to repeat its picturesque career.

CONTROL MEASURES

The following control measures may be adopted in the orchards:

(1) The infested fruits should be promptly removed and buried

(2) As many adults as possible should be caught by hand-nets and destroyed.

(3) The fruits may be covered with loose muslin-bags

(4) At the Indian Agricultural Research Institute, dusting with Paris-green mixed with lime, talc and flour in the following proportions has given satisfactory results:

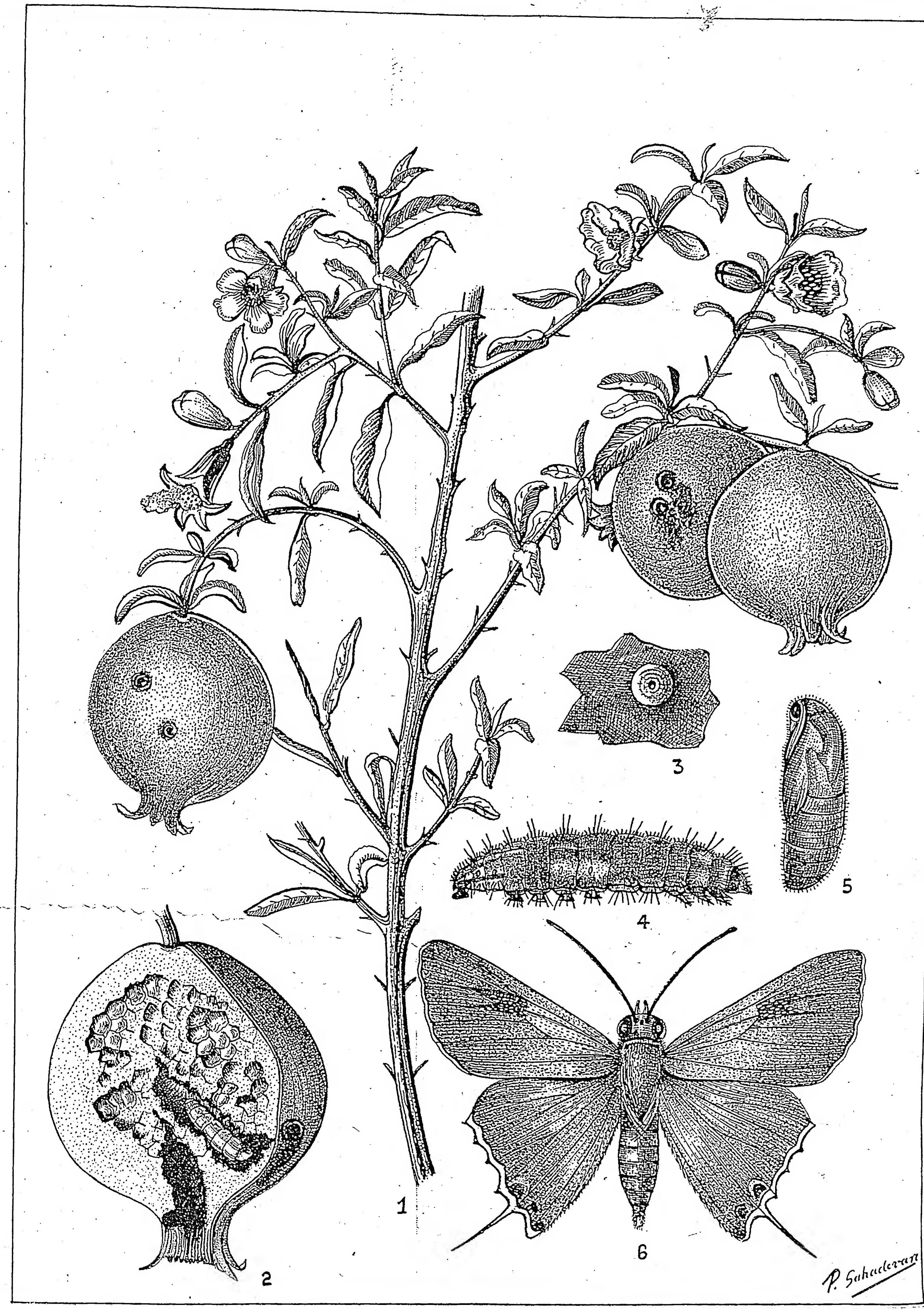
Paris-green	2.25 lb.
Lime	1.25 lb.
Talc	3.75 lb.
Flour	1.0 oz.

Note: This quantity is sufficient for 10 plants only.

Dusting is to be done twice or thrice in a month according to the degree of infestation.

"VIRACHOLA ISOCRATES" FABR.

1. An "anar" plant showing the fruits infested by the pest
2. An infested fruit cut open to show the damage done by the caterpillar
3. Egg
4. Caterpillar
5. Pupa
6. Butterfly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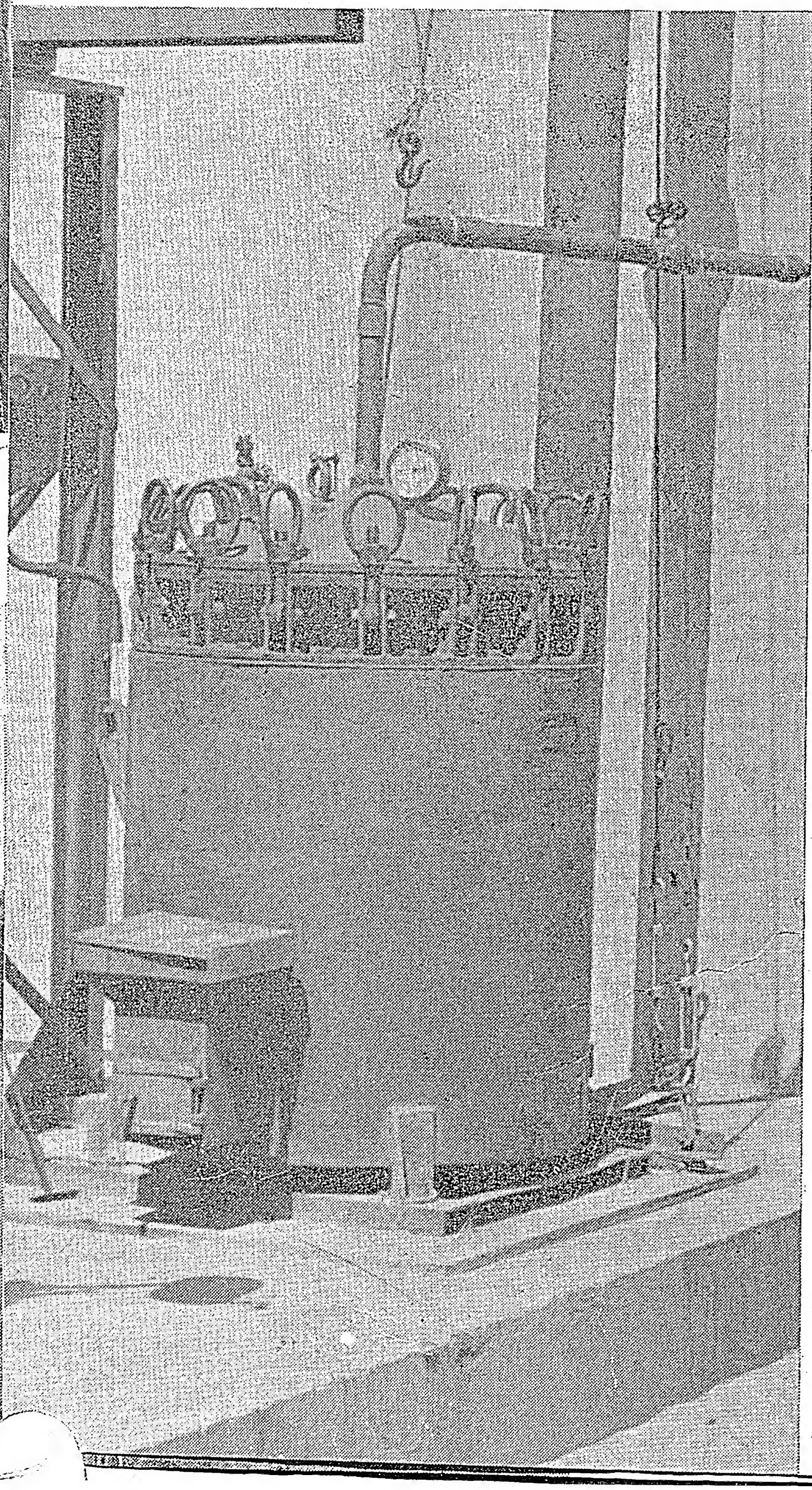
P. Sahadevan

Bone-Digester*

By G. R. VALUNJKAR and
P. V. MANE



Bone-digester

PHOSPHATES form an important nutrient available to the plant from the soil. Soils under cultivation should be replenished with this plant-food material by applying phosphatic fertilizers. From time immemorial, bones have been a major source of phosphates to Indian soils. For easy application and better results bones have to be crushed. Various methods, mostly crude, are in vogue for this purpose. In Japan, however, an efficient and practical method for preparing bone-meal fertilizer is practised by using a bone-digester. A high-quality fertilizer, namely, steamed bone-meal is obtained from the working of a digester in addition to other by-products, which makes it a paying proposition. Such a type of bone-digester recently introduced into our country will not only guarantee a supply of adequate quantities of steamed bone-meal at a cheaper price but will also help in the setting up of a new small-scale industry.

A bone-digester is meant for the cooking of bones. Chopped bones, when subjected to hot water and steam lose glue and become soft. These can then be easily ground into a powder to obtain steamed bone-meal which contains a good amount of phosphoric acid and a small quantity of nitrogen.

The first bone-digester imported from Japan and tried at the

*A detailed note on the Bone-digester can be had from the Bone-meal Adviser to the Government of India, New Delhi.

Indian Agricultural Research Institute, New Delhi, had the disadvantage of showing a high cost of working, and as such, was unsuitable for adoption on a wide scale in India. Subsequently, a new type of the digester with necessary improvements to lower the cost of production was designed and tried at the National Physical Laboratory, New Delhi, with successful results.

The digester is 27 ft. (D) x 30 ft. (H) with a volume of about 10 cu. ft. and a capacity of 62 gallons. The whole plant consists of (i) a digester, (ii) a cage to hold the bones, (iii) a combustion chamber with a fire-box and about 20 feet high chimney and (iv) a lifting tackle to lift the heavy lid and the cage.

Normally, a working pressure of not more than 30 lb. is required for steaming of bones and extraction of glue. However, this digester is designed to have a working pressure of 70 lb. and a temperature of 150°C. so that it can be used to sterilize bone-meal so as to be suitable for feeding to cattle.

SETTING UP A BONE-DIGESTER

The digester is self-contained and needs no elaborate construction. It can be worked in the open. A one-foot high paved platform should, however, be provided in order to avoid water-logging. A thatched hut or a small pit of about 1,000 cu. ft. volume should suffice to hold 50 tons of bones. Barbed wire protection to avoid the menace of dogs, jackals, etc. should be provided. Another shed to store fuel, ready bone-meal, tallow and other products should also be constructed.

Bones in their raw condition emit an unpleasant odour. During cooking, especially, a still more unpleasant smell is emitted when the steam is let out and the lid opened. It is, therefore, advisable to set up the bone-digester at a safe distance from human habitation.

WORKING

Bones to be cooked should be made into small pieces of 1½ in. in size. A labourer can cut three to four maunds of bones per hour to the required size with an axe or a hammer.

The cage should be put in the digester and filled with bones. Sufficient water should be added to cover the entire quantity of bones. When the digester is full, the lid should be put on and the digester lighted through the fire-box.

When the pressure gauge shows a pressure of 1-15 lb., fat of the bones melts and comes to the top. The tallow-removing cock of the digester should then be opened and the liquid tallow drained out. This liquid when allowed to cool solidifies and tallow floats on water. This can then be purified and tinned for marketing.

A pressure of 30 lb. for an hour should be maintained for proper cooking of bones. Steam should then be let out and water drained out completely. The bones should be hammered when hot. This helps in removing the sticky glue adhering to the cooked bones and the process of powdering is rendered quick and easy.

The hammered, steamed bones can be worked in a *dheki* or a suitable crushing device, powdered to required mesh, bagged and stored for marketing.

FAT AND GLUE

The main product obtained by working a digester is steamed bone-meal, a valuable phosphatic fertilizer. The by-products are fat and glue. The recovery of fat is important as fat fetches about Rs. 1,000 per ton in the market. Considering this, efforts should be made to collect as many green bones as possible as they contain more fat. Raw bones contain about 15 to 20 per cent glue. However, about 10 per cent glue on the dry bone weight basis is obtained in the process of cooking bones.

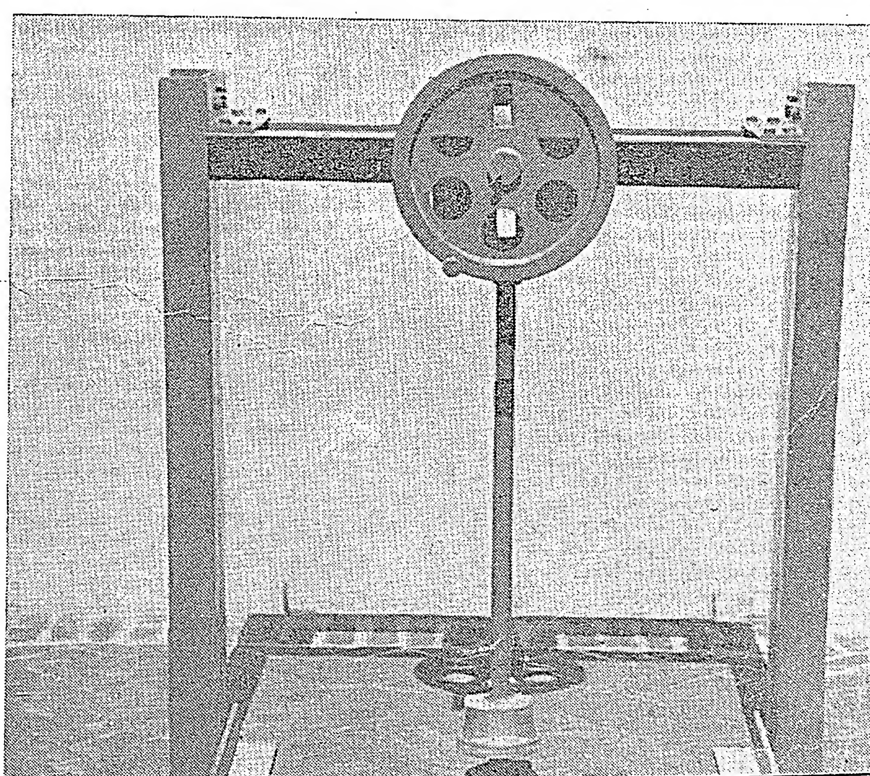
The digester can also be used for cooking dead bodies of animals after skinning, to digest leather cuttings or worn out leather footwear, horns, hoofs, etc.

SCOPE OF THE INDUSTRY

Experiments have shown that about 240 lb. of bones can be cooked at a time. In a working day of

(*Contd. on page 15*)

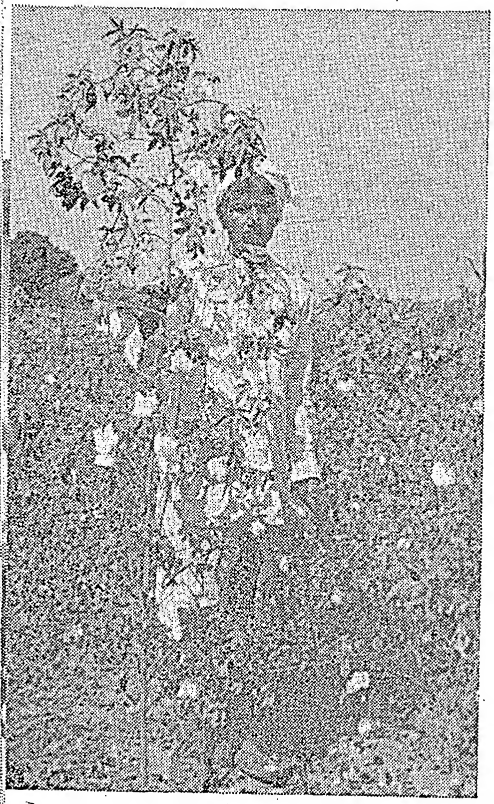
"Dheki" for crushing bones



SOIL CONSERVATION

By N. R. RAMAIYAH

A crop of improved cotton on Saruwadi Farm



SARUWADI Farm is an ideal farm on the Nagpur-Chhindwara road and belongs to Dr. Dongre. Modern soil conservation practices such as terracing, bunding, plugging of gullies, levelling, etc. are followed on this farm. Dr. Dongre, formerly a medical practitioner, purchased this 64-acre farm sometime ago, at a nominal price of Rs. 25 per acre. This land had been out of cultivation for a long time because of low yields that it gave.

The importance of adopting sound cultural practices has been very well demonstrated on this farm. Besides checking the waste of fertile soil by means of soil conservation methods, Dr. Dongre has improved the fertility of his land by using liberal quantities of farmyard manure and compost; the latter he obtains from Nagpur. The expenditure incurred by him on the improvement of his land has started paying dividends in the shape of bumper crops that are now being obtained from it.

Tomato crop

Once gullied, this land now grows "jowar" and "til"

PRACTICES PAY

"Tur" crop

Dr. Dongre has introduced the rainy-season crop of tomato on his farm and grows many other vegetables by irrigation from the small well that he has sunk near his farm-house. Encouraged by good yields, he now proposes to install a pump-set to bring a greater area under well-irrigation. The following figures of yields of various crops raised on this farm speak for themselves:

Year	*Total out-turn in maunds*			
	Jowar	*Tur*	*Cotton*	*Tomatoes*
1950	75	25	—	125
1951	150	25	19½	150
1952	90	60	29½	250

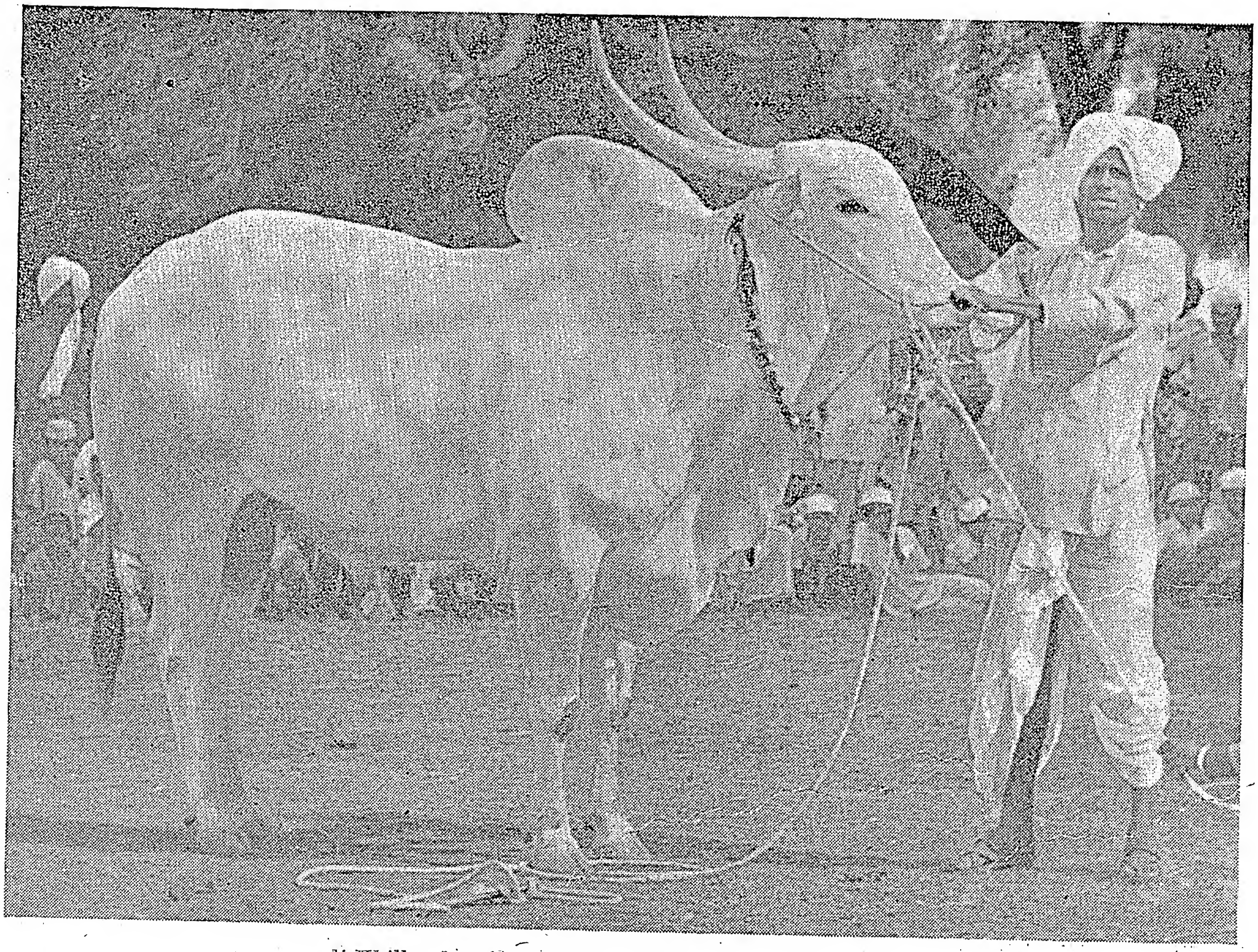
The above figures clearly indicate how the yields have been increasing from year to year. There is, however, a fall in the yield of *jowar* in 1952 over 1951 on account of insufficient rains for the light and slopy soil of the farm, and infestation of the crop by striga.

"Jowar" crop

Land made productive by gully-plugging

Khillar Cattle Show at MAHUD

By S. P. DHAMALE



A Khillar breeding bull—the best bull of the Show.

INTENSIVE cattle improvement has been undertaken by the State Department of Agriculture in the Sholapur district of Bombay State since 1926. With the co-operation of the local cattle breeders a new breed of Khillar is being evolved here. At one time the Khillar bullocks were considered as fast-trotting draught-animals which could transport goods in quick time and could live even in scarcity conditions. With the changing agricultural conditions in the country it became necessary to mould out of this important Deccan breed, a type which could be useful both as a draught-cattle as well as a milk-yielder. The puny, trotting animal is now being replaced by a heavier and a powerful draught-type.

The farmers once believed that the Khillar cow would not and should not yield milk to the pail as she was to be utilized only for the production of fast-moving draught-animals. This aspect of the maintenance of pure-bred Khillar cow is fast changing with the introduction of the new type, bred in the intensive cattle improvement zone of the Sholapur district. It is not

uncommon for a cow of the new type to yield eight to ten pounds of milk a day, and outstanding animals yield 15-20 lb. of milk at the peak period of lactation. It is hoped that in the next decade the Khillar breed in this area will not only develop as a useful dual-purpose animal but will vie with the best milking breeds of India.

The annual Khillar Cattle Show was held at Mahud, District Sholapur, from 13 to 17 December, 1953.

In spite of acute scarcity conditions that prevailed during 1953, about 4,000 cattle of this breed were brought to the Show which also serves as a market where selected animals of this breed are bought and sold. The farmers from other districts attend the fair and purchase animals for breeding purposes. The local breeders vie with each other in the contest for championship and prizes. This helps them in the selection of superior type, leading to progressive development of the breed. The pure-bred lot is divided into age and sex groups, and each section is judged for its excellence. The special feature of the Show is the milking competition among the animals of the pure-bred type. This year the average milk yield for a period of three days varied from 15 to 19 lb. per day.

Besides the Cattle Section, the Khillar Breeds' Associations, which sponsors the Show, also organizes a section for the sale of sheep and an exhibition of the improved type of sheep. A number of shepherds in the area maintain white-wooled improved sheep. These are brought in large numbers for exhibition. The selected rams and ewes are awarded prizes according to the age groups. A number of school children in this area are helping the Department of Agriculture in rearing fine-wooled rams. A demonstration is also arranged to show how to handle the best types of wools.

One of the important rural occupations in Sholapur district is the rearing of pure-bred and graded poultry. The farmers in the vicinity of this fair bring selected birds for exhibition and competition.

In brief, the Show serves as the focal point for the improvement of livestock in the Sholapur district and adjoining areas. The bulls of the Khillar breed are sent out to all the districts of Deccan, and the farmers from the northern districts of Deccan to the southernmost part of Dharwar district attend this fair to buy the best specimens of the breed.

BONE-DIGESTER

(Continued from page 11)

eight to nine hours, four charges can be taken, thus cooking 1,000 lb. of bones per day. The digester can cook about 100 tons per year of 225 working days.

A ton of bones is generally available in a village in a year. A digester of this type can thus be located in a central place to serve 100 to 125 villages. This would ensure the collection of every piece of bone available in the area.

ECONOMIC METHOD

Steamed bone-meal as compared to raw bone-meal contains a higher amount of soluble phosphoric acid and is naturally entitled to a premium price over raw bone-meal. By this method of manufacture, however, the fertilizer costs much less comparatively. In addition, the recovery of tallow and glue adds to the income.

Any cheap fuel such as available local waste, saw-dust, waste tan, paddy or groundnut husk, wood shavings, etc. can be used to bring down the cost of manufacture. At Delhi, saw-dust and waste pieces of packing boxes were used for the experiment.

NEW DELHI EXHIBITION ON JAPANESE METHO

By HARKIRAT SINGH

AS part of the propaganda to popularise the Japanese Method of paddy cultivation, an exhibition was organized by the Ministry of Food and Agriculture in Parliament House in New Delhi, from 15 to 18 February 1954. Exhibits were put up representing the various features of the campaign launched by the Ministry in 1953. These exhibits included a pictorial representation of how the campaign was actually organized, the media and methods employed and the results achieved. This exhibition was specially meant for the members of both the Houses. The members evinced keen interest in the Exhibition which was apparent from the eager enquiries that they made about the various exhibits.

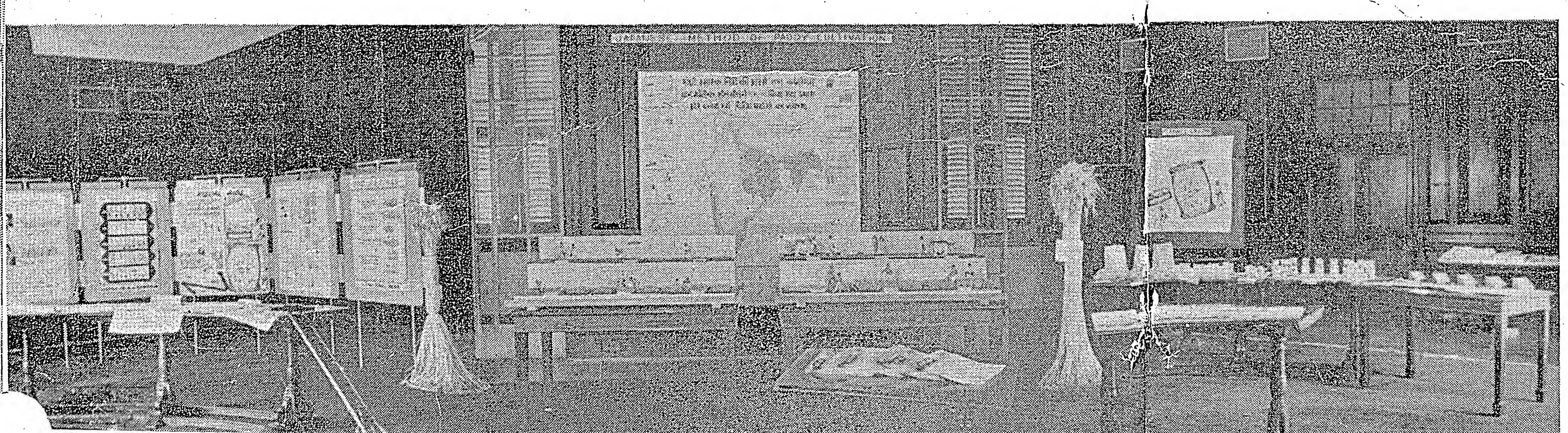
The Exhibition consisted of five main panels. The first panel displayed the photographs of a few crop-competition winners. These progressive farmers had distinguished themselves by obtaining very high yields of paddy and had thus created enthusiasm among fellow farmers to improve their yield. Once such a feeling has been generated, it becomes easy to build upon it and introduce better methods. This fact had contributed a great deal to the success of the campaign.

The next panel recorded the various stages of the campaign, namely, meetings of the experts to work out a definite line of action, radio broadcast by the Central Minister of Agriculture to enlist popular support and actual work in the villages to convince the farmers of the benefits of adopting the new method. The success of the campaign as reflected by the encouraging reports from the States clearly indicated that the campaign was well-organized.

The third panel exhibited the various media and methods that were made use of in this campaign to convey the ideas to the farmers. It would not be wrong to say that the media and methods employed formed the core of the campaign. Much depended on them in making the campaign a success. They serve as a vital link between the promoters of the campaign and the man behind the plough. However valuable may the information be, if it is not conveyed to the farmer in a manner acceptable to him, it is likely to fall flat on him. The exhibits in this section included posters, film-strips, pamphlets, circulars, flip-books and the flannelgraph.

The fourth and the fifth panels spot-lighted the vast area at present under the new method, high yields obtained by individuals by adopting this mode of cultivation and the increase in the consumption of fertilizers. It was shown that a total of 2,06,175 acres in different States had been put under the new method. In addition, the method had been partially adopted over additional 30 lakh acres, the part specially accepted being the application of fertilizers. Data relating to the fertilizer consumption revealed that for the period ending 30 September 1953, 2,12,754 tons of ammonium sulphate were consumed as against 1,89,172 in 1952. It may be pointed out here that the data relating to 1953 covered a period of nine months only.

Two effective models sent by the Bombay Government describing the various steps that constitute the Japanese Method were also on display. In short, the various steps are: preparation of a raised seed-bed, selection of right type of seeds, lesser seed-rate,



A panoramic view of the Japanese Method Exhibition held at New Delhi

line-sowing at the time of transplanting, proper interculturing, etc. Then there was a collection of the improved varieties of paddy from the States that had been used in connection with the new method. Actual paddy-stalks with their ear-heads intact lent a realistic touch to the Exhibition; profuse tillering on these stalks bore testimony to the rich harvest obtained.

Multi-lingual publications brought out by the Central as well as the State Governments were also one of the items exhibited.

The Exhibition reflected determined efforts on the part of all concerned to produce more, and even a casual visitor was impressed by the exhibits. The spectacular results spoke for themselves. Even if it is accepted, that the Japanese Method is nothing very novel, it has to be admitted that it is a "sane and scientific method of paddy cultivation" and as such deserves promotion. The method has great potentialities for augmenting the food supplies of the country, and that is the strongest point in its favour.

Maize-Breeding Work In India

By **S. M. SIKKA**

AMONG the cereal crops grown in India, maize is cultivated over an area of about 8.5 million acres and gives an annual production of over 2.5 million tons, ranks in importance as a food crop next only to paddy, *jowar,* wheat and *bajri.* This cereal occupies the largest area in Uttar Pradesh, Bihar and Rajasthan, but is grown on quite an extensive scale also in several other States of the Punjab, Madhya Bharat, Bombay, Hyderabad, Madhya Pradesh, Himachal Pradesh and Jammu and Kashmir. Maize is of special importance in the hilly and sub-montane regions of the country, where it forms the staple diet of the people particularly in the winter months. In northern parts of the country, it is extensively grown as a fodder crop also. The 'flint' variety, among which the red-grained biotype predominates, forms the bulk of the maize crop grown in this country.

MAIZE-BREEDING SCHEMES LAUNCHED BY I.C.A.R.

Even though maize occupies an important position both as a food and fodder crop of India, it remained practically neglected at the hands of the plant-breeders until about a decade ago. The first concrete step towards the improvement of this crop was taken only in 1945 when the Indian Council of Agricultural Research, in collaboration with the Punjab Government, launched a scheme with its headquarters at Lyallpur (now in Pakistan), for synthesizing improved maize hybrids first at Lyallpur and then at Jullundur on the lines of the work done in the U.S.A. With the partition of India on 15 August, 1947, the venue of this scheme was shifted to Jullundur in the Punjab (India) and its work

Two varieties of hybrid maize plants (flanking the worker) contrasted with the best U.P. commercial variety (extreme right)

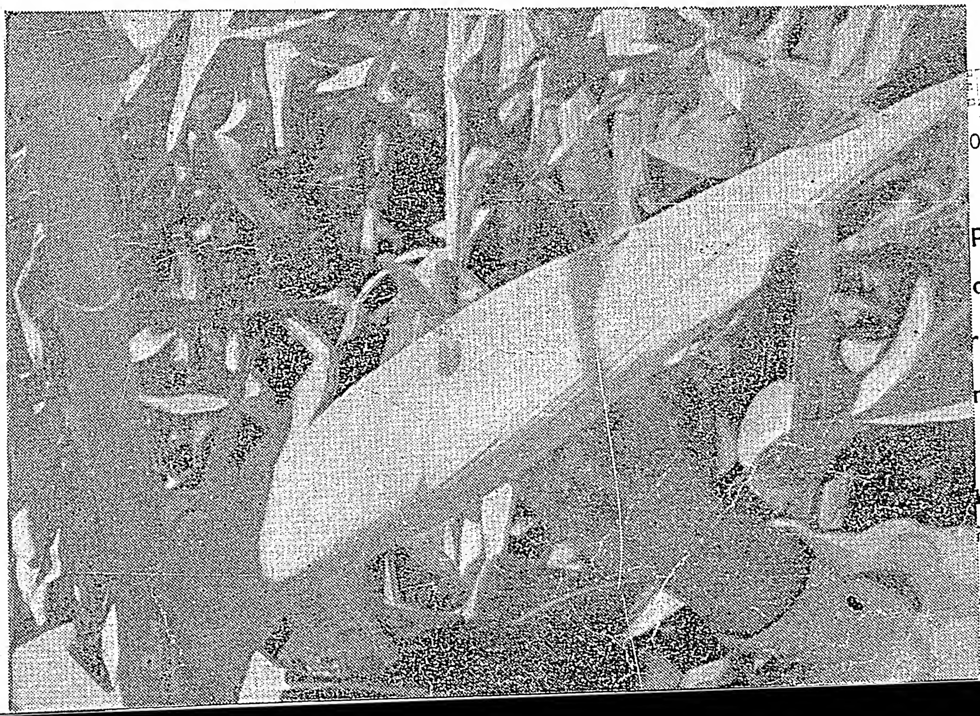
has continued at that place since then. Simultaneously with the sanctioning of the Punjab Scheme, the Indian Council of Agricultural Research extended financial assistance for starting another scheme. At the Indian Agricultural Research Institute, New Delhi, and in several other States breeding work on this crop was taken up. Lately, the Council has sponsored six more breeding schemes jointly with the Governments of Uttar Pradesh, Rajasthan, P.E.P.S.U. West Bengal, Bihar and Hyderabad, and these, along with the Punjab and Delhi Schemes, form a chain for tackling the maize improvement work of the country on a regional basis. The work of all these schemes is being properly co-ordinated by the Council so as to bring about free exchange of breeding material and technical knowledge with a view to achieving results of practical utility within as short a period as possible.

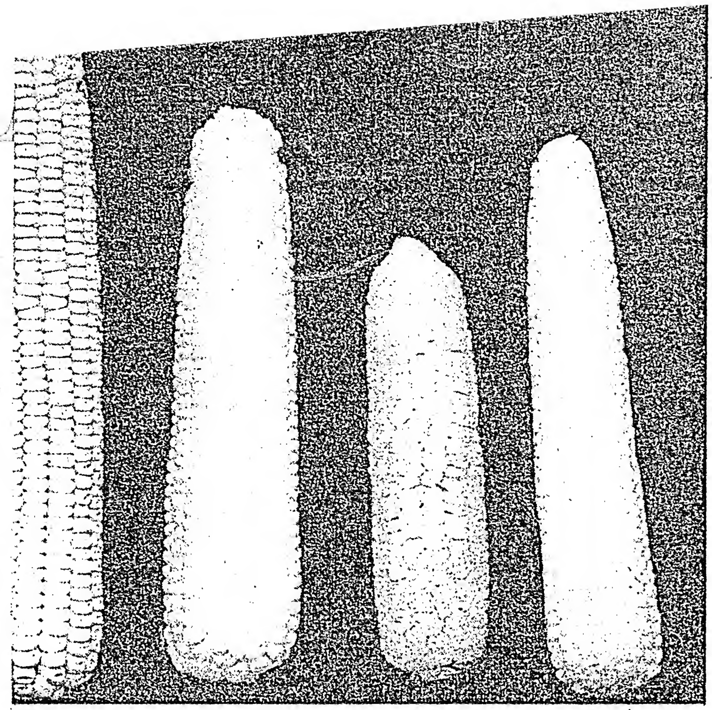
LINES OF WORK AND RESULTS ACHIEVED

The work of all the maize-breeding schemes is being carried out on the lines of the 'hybrid corn' technique, which has been evolved, perfected and so successfully used in the United States of America. The essential steps of this technique are: (i) collection of samples of local commercial varieties of corn and their field-study with a view to spotting out the agronomic merits and demerits of each, (ii) inbreeding of promising commercial varieties through successive generations for isolating inbred lines homozygons in major agronomic characters, (iii) determination of general combing ability of inbred lines through 'top' cross performance, (iv) attempting 'single' and 'double' crosses between promising inbred lines and assessing economic potentialities thereof and (v) production of hybrid seed on a commercial scale for supply to the cultivators. As most of the maize-breeding schemes were launched only recently, their work is yet in its infancy. The Punjab Scheme, which has been in operation for over eight years, has made good headway in so far as over 15,000 plants derived from 300 commercial varieties have been hand-pollinated and quite a few lines, some of which have been self-fed for eight successive generations, have attained apparent homozygosity. The work of this scheme has shown, that while most of the lines do not attain reasonable purity for such characters as yield, height, size of grain, etc., even after six to seven successive generations of selfing, a few do so after only three-four successive selfings. The advantage offered by the latter lines has been fully exploited in this scheme for making 'top' and 'single' crosses at a much earlier stage than it would have been possible normally. So far, over 500 'top' and 1,000 'single' crosses have been made and tested and quite a few of these have out-yielded the best 'local' varieties kept as standards, by significant margins, the excess in yield in some cases ranging over 100 per cent over the local varieties. Some of these cross combinations have been observed to give good performance consistently for two to three years and it is hoped, that, before long it would be possible to develop suitable 'double' crosses from these cross combinations for general cultivation in the State. The work in this connection is being expedited by raising two crops of maize in a year, the first, early one, grown in the spring season in hills and the second the normal monsoon crop. Raising two crops of maize in a single year has been adopted in some other schemes also with a view to advancing the breeding work as much as possible.

While the schemes in the Punjab, P.E.P.S.U., Uttar Pradesh, Rajasthan, West Bengal, Bihar and Hyderabad are concentrating on synthesis of high-yield hybrids, the emphasis in the scheme operating at the Indian Agricultural Research Institute, New Delhi, is mainly on problems of fundamental importance. The most important aspect, on which work is

A cob of U.S. 13
at Almora





Four main types of maize—(left to right) dent, flint, sweet and popcorn.

being carried out under this scheme, is to find out short-cut methods, by which inbred lines could be produced in one step instead of seven to eight years required under the commonly used selfing method. Comparative merits of selfing and sib-mating for the production of inbred lines are also being investigated. Still another problem of far-reaching value being tackled is connected with the study of methods by which the hybrid vigour usually exhibited by the F1 plants could be conserved for two or more generations so as to obviate the necessity of producing hybrid seed of promising crosses every year. In this connection, the effect of induction of polyploidy in open-pollinated and inbred lines as well as that of making multiple crosses of diploid and polyploid inbreds is being studied. The possibility of synthesizing high-yielding strains by the application of the convergent improvement method is also under investigation. These studies, if successfully completed, will greatly simplify the maize-breeding technique. Their results have, therefore, to be watched with great interest.

TRIAL OF FOREIGN HYBRIDS

As 'hybrid corn' technique is a long range process, requiring 8-10 years for bringing out an improved variety of maize, the Indian Council of Agricultural Research thought it advisable to import ready-made double crosses of 'dent' corn from the U.S.A., Australia and Canada and to test them in this country with a view to finding out if any of them would suit the Indian conditions. At the instance of the Council, therefore, The Indian Agricultural Research Institute, New Delhi, arranged a co-ordinated trial of 36 foreign hybrids in almost all the important maize-growing States. These trials have been carried out both in hilly tracts and plains for the last three years and the indications are that some of them can be successfully grown in this country, particularly in the hilly tracts. The results have been generally favourable to American and Australian hybrids, among which U.S. 13, Dixie 11, Dixie 22, Dixie 33 and N.C. 27 have recorded better yield performance than the local varieties tested against them. In the Punjab, U.S. 13 has outyielded the local maize of Kulu Valley consistently for three years with an average yield excess of 7.94 md. of grain per acre.

PRODUCTION OF HYBRID SEED ON A COMMERCIAL SCALE

Since, as a result of the work done in some of the maize-breeding schemes, high-yielding double crosses are likely to become available shortly, the Indian Council of Agricultural Research, has already initiated steps by which production of hybrid maize seed on a commercial scale could be arranged on modern lines. The most important problem that has to be faced in this connection is that there are no commercial firms of the type met with in the U.S.A., in this country for undertaking seed production work. The Council is, therefore, procuring the services of an expert under Point-4 Programme to advise on this important subject.

Side by side with the above arrangements, the Council has recently initiated a pilot scheme at Almora in Uttar Pradesh for producing annually 100 maunds of seed of U.S. 13, which exotic hybrid has given good yield performance in some parts of the country and of which inbred lines are available.

DEVELOPMENT OF SWEET CORN

Apart from the breeding schemes which aim at evolving improved hybrids of the local 'flint' corn, the Council sanctioned in April, 1952, a scheme for

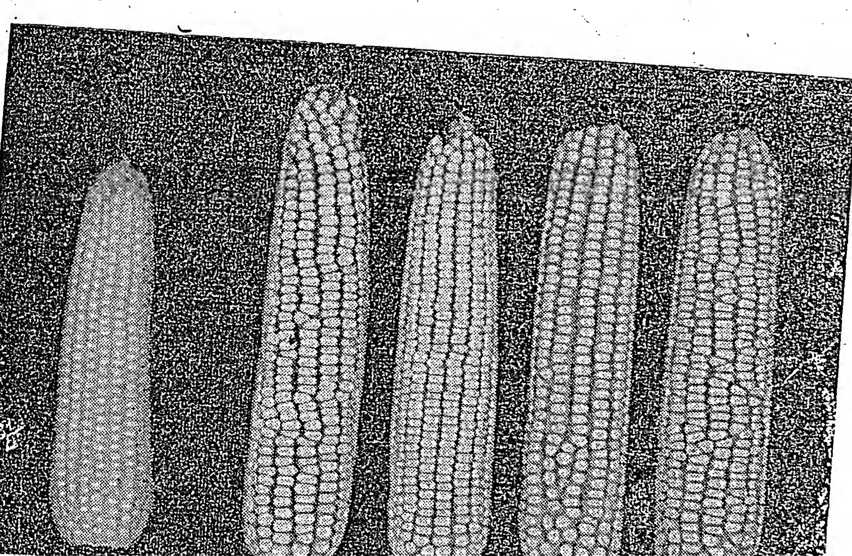
developing cultivation of sweet corn in the hilly tract of the Punjab (India). This scheme is functioning in Kulu Valley of Kangra district and work of testing imported varieties of sweet corn as well as finding out the agronomic treatments which will enable such corn to be cultivated successfully, is being pursued thereunder. As the work of the scheme has been in progress for only one season, it is premature to arrive at any definite conclusions. However, the indications are that some of the imported sweet corn hybrids can adapt themselves to the local conditions and give as good yield as the indigenous 'flint' varieties.

Technique of controlled pollination

ALL-INDIA BEE-KEEPING CONFERENCE

The All-India Bee-keeping Conference, convened by the All-India Bee-keepers' Association, will be held at Mahableshwar in North Satara district of Bombay State, on 8, 9 and 10th May, 1954. The Conference will take place under the auspices of the Village Industries Committee, Bombay State.

Those interested may write to Shri S. G. Shende, Regional Organiser, Village Industries Committee, Bombay State, Maharashtra Region, 361, Sadashiv Peth, Poona 2.

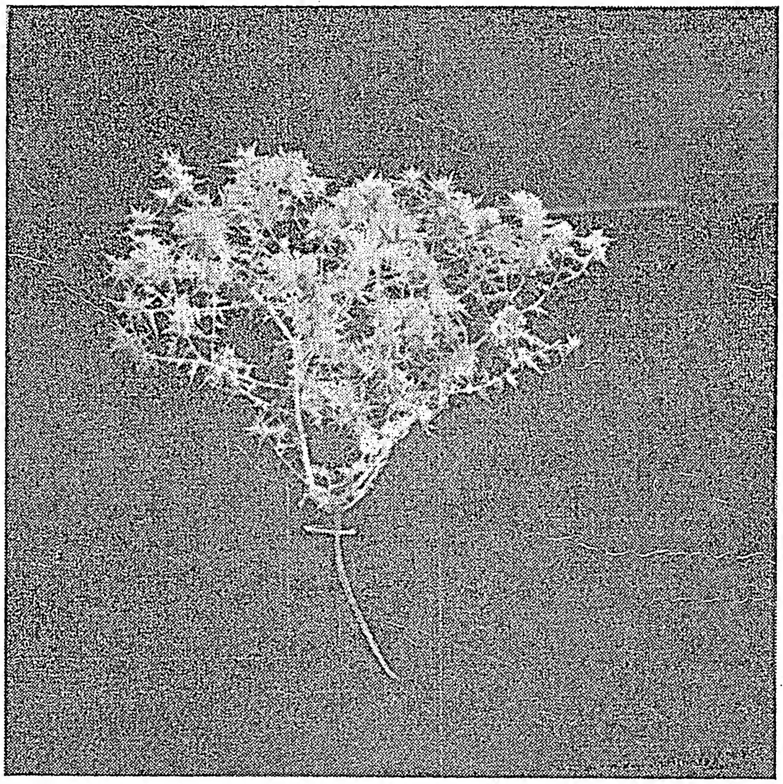


The cobs of Pusa Yellow and a number of maize hybrids

FARMERS, BEWARE OF THE WEED —*Carthamus oxyacantha*, BIEB

Dr

By D. N. SINGH



"Carthamus oxyacantha", Bieb

CULTIVATORS in Uttar Pradesh believe that the seeds of the weed *Carthamus oxyacantha*, Bieb., locally known as *kateri* or *balesara*, were brought to this State by the *pili aandhi* (yellow dust-storm) a few years ago. These seeds are white, whitish or mottled and resemble safflower seeds, though smaller in size. These seeds lie dormant in the soil throughout the rainy season and winter but begin to germinate as the weather warms up in March. The drier the field the more rapid is the growth of the seedlings. These seedlings are found growing in abundance in the fields sown with wheat and barley, and in the plots having no crop at all. In the fields sown with other *rabi*-crops only stray plants are to be found. In the fields under *arhar*, these are conspicuous by their absence excepting on bunds (ridges).

HOW IT SPREADS

Apparently, a strong sun and a dry weather are conducive to the growth of this weed while shade and moisture retard it. By the harvesting time of the *rabi*-crops, the hardy, branchy and spiny plants of this weed fully establish themselves and attain a height of about six to nine inches. Because of their numerous prickles, persons harvesting the crops dare not touch them and leave them out to grow undisturbed with no crop plants to compete with them. Inflorescence starts early in April or even earlier than that and about the middle of this month, the infested areas assume a yellow appearance because

of the same colour of the flowers. Flowering and fruiting continue till June. The seeds which are produced in hundreds by a single plant, are distributed over large areas by the summer winds. In this way, this weed goes on spreading wildly.

Carthamus oxyacantha belongs to the family *Compositae* and exhausts the soil very much. In spite of all agronomical literature advocating hot-weather cultivation and efforts of the Agriculture Department to convince the farmers of the advantages of this practice, it has not been adopted excepting on Government farms and a few other private farms belonging to progressive farmers. Because of excessive heat in summer causing denitration, unopened soil of the State loses a considerable amount of nitrogen and is thus depleted of the most important ingredient of plant-food. Thick growth of this weed does prevent denitration to some extent, but being very exacting, the plants of this weed absorb a much greater quantity of plant-food from the soil, leaving it greatly impoverished. As a result, the crop-yields are considerably reduced. Besides, the spiny plants of this weed render the harvesting of *rabi*-crops very inconvenient. Usually, the cultivators cut these plants before the advent of the monsoon, collect them and burn them in order to avoid injury to their feet from the spines while ploughing the fields. But by then, the seeds are already spread over the land.

CONTROL MEASURES

Early action is needed to destroy this weed wherever it exists at present and to stop further dissemination of its seed. The following suggestions are offered to get rid of this menace:

(1) Wherever possible, land may be opened with a soil-inverting plough soon after harvesting the *rabi*-crops. This weed will thus get uprooted, buried and converted into manure.

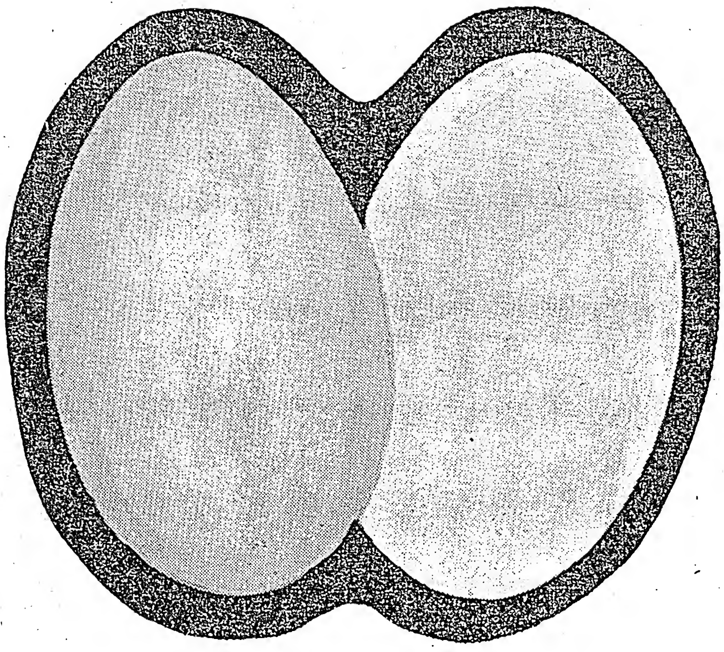
(2) Plants should be cut before they start flowering and buried in a pit and composted.

(3) Crops like *arhar* may be raised in the fields infested with this weed with a view to smothering the weed.

Piece-meal eradication of the weed will be of no avail as dry plants and seeds are easily blown away from one place to another by strong wind. Co-operative efforts should be made to destroy the weed before its flowering stage sets in.

CONTRIBUTORS ARE REQUESTED

to kindly submit two copies of all articles, notes, etc. intended for publication in "Indian Farming". The articles should be clean-typed in double space on one side of paper, leaving a sufficient margin on the left-hand side. Contributions may be addressed to the Editor, "Indian Farming", Indian Council of Agricultural Research, Jamnagar House Hutments, Mansingh Road, New Delhi 2.



A FEW WORDS ON DUCK-KEEPING IN ASSAM

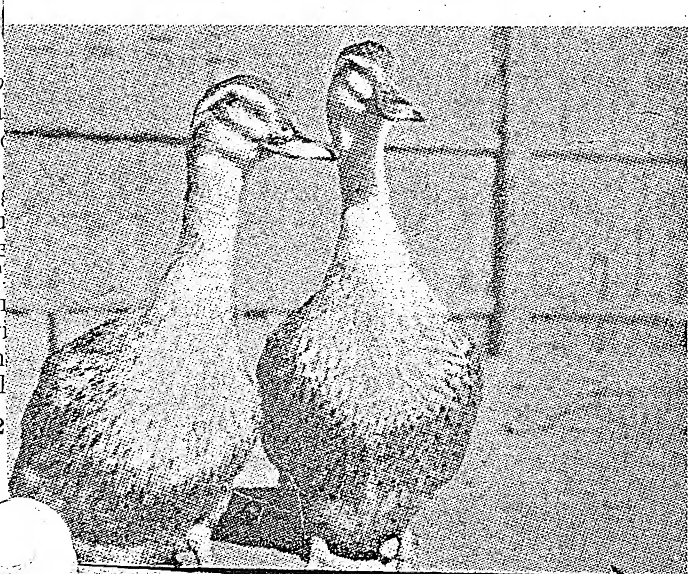
By D. L. PAUL,
Assistant Deputy Director of Animal Husbandry & Veterinary Department (Livestock), Assam

THE State of Assam has a good rainfall (an average of 150 in.) which encourages several species of wild ducks and water-fowls living and breeding in its rivers, lakes and swamps. The domesticated birds frequently mix with the wild birds, and as a result, some nondescript breeds are met with here. These are maintained by the local people living in the plains and low-lying areas for producing meat and eggs.

According to the census of 1951, the State possesses about 15,18,494 ducks worth about half a crore of rupees. A trade of the value of a similar amount is being carried on annually in the State by way of supplying eggs and meat from the ducks. In fact, a substantial portion of the State's supply of eggs is derived from the ducks. While working for the improvement of the ducks, it was found that some of the native types possessed potentialities which had also attracted the attention of the Livestock Department of the State in its early days. Lately, with very limited resources a few trials were laid out to find out a 'utility strain' of ducks which could be at home in lakes, ponds, streams and other aquatic areas of the State and which would also compare favourably with the famous foreign ducks like Aylesbury, Pekin, Khaki-Campbell, Rouen and the famous Indian Runner.

Three country-types of ducks, viz., Local Mete, Nageswari (white-breasted) and Cachar Nageswari (big type) were selected in or about the year 1937

The local breed, Mete ("Pati Has")



Assam-Nageswari ducks (white-breasted)

and stocked at the Pukra Duck Farm near the Habibganj Farm (now in East Pakistan) for studying their potentialities.

Work on these birds could not be completed as the stock with the farm had to be handed over to Pakistan in 1947.

IMPORTED DUCKS

In the meantime a small lot of Khaki Campbell ducks was also imported from England in or shortly after 1938 by Messrs. Woodford and Hazarika, and was kept at the Khanapara Farm. But this small lot did not show any superiority over the local breeds in its new environments during the short period it was under observation, and could not be maintained for a longer period on account of abolition of poultry development work in this State.

Although the Pukra Duck Farm no longer belongs to this State, certain information collected as a result of the work done there in the past might be of some interest and is briefly mentioned below.

LOCAL DUCKS

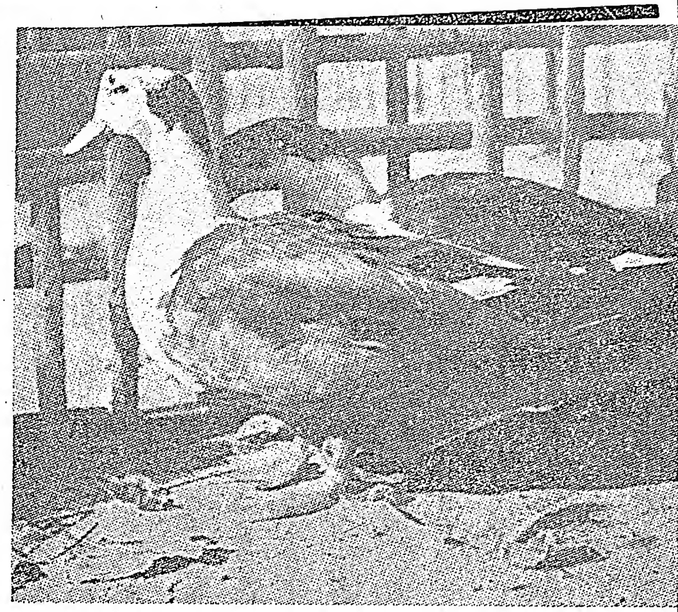
The local breed Mete (*Pati Has*) was tried. Under farm conditions, with proper feeding, breeding and management the results obtained were:

Weight of male	3½-4 lb.
Weight of female	3-3½ lb.
Number of eggs laid annually	100-150 per female
Colour of eggs	White
Weight of egg	1.5-1.8 oz.
Colour of females	Dark-brown, black-pencilled and shaded grey
Colour of males	Irridescent green and blue, glittering to some extent, with a light collar-mark

When the male duck matures, a few of its tail feathers curl upwards. The ducks of this breed resemble the famous Rouen duck which is considered as a direct lineal descendant of the wild Mallard.

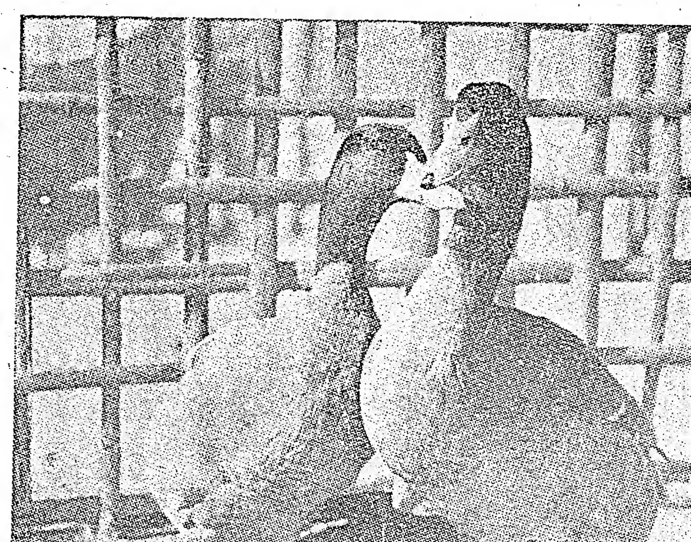
Nageswari ducks have black-coloured back with a white breast, bearing some likeness to Blue Swedish duck, but lay greenish eggs like Rouen ducks. With good management, breeding and feeding the following results were obtained:

Weight of male	3¼-3½ lb.
Weight of female	3¼-3½ lb.
Number of eggs laid	100-150 per duck generally; instances of 200 eggs in a year were not rare
Colour of eggs	Greenish; some of the birds of this breed were also found to lay eggs of a snow-white colour
Weight of egg	More than two ounces



Assam Nageswari drakes (white-breasted)

The Khaki-Campbell ducks imported from England



The Khaki-Campbell drakes imported from England

Cachar Nageswari ducks are of a dark-brown colour with black-pencilled tips and have a long body. They lay greenish eggs. Work on these birds did not make much progress before the partition and very few observations are on record.

CONCLUDING REMARKS

Ducks play an important role in the rural economy of Assam. Besides supplying food, ducks control many animal diseases by eating up snails, etc. In view of their natural immunity against many diseases and the large number of streams, pools and lakes available in the State due to abundant rainfall, duck-keeping, if properly undertaken can appreciably supplement the national income. So long, duck-keeping has been tried in the Livestock Farms of the State as a side-show along with poultry-keeping, but systematic and concentrated work on an adequately large scale is expected to improve the indigenous birds and thus add to their utility. It, therefore, seems desirable that as a measure of developmental work, establishment of duck-farms should be encouraged on a regional basis.

EDITOR'S PAGE

(*Contd. from page 6*)

I may again repeat that expert advice should be sought in the utilization of chemical fertilizers. But a minimum dose of about 200 lb. per acre is not likely to do any harm in any case. Whether it should be ammonium sulphate or super-phosphate or any other fertilizer mixture is for the Department of Agriculture to say for any particular area. Steps are being taken to see that chemical fertilisers are available not only by way of taccavi but also at prices as low as possible.

The talk about the soil having lost its fertility is, in my view, a totally false cry. But if it is at all true of any area, let us make an effort to put fertility back into the soil. All that needs to be done is an honest effort and, as has now been demonstrated, a little effort is capable of paying very rich dividends.

Another suggestion I have to make is in respect of establishment of nurseries for the preparation of seedlings according to the Japanese method. I think officers of the State Departments of Agriculture, village panchayats and public workers may probably be able to encourage the preparation of these seedlings by selected cultivators in a village or even in a group of villages so that others may be able to purchase them. In my view, it is wrong to belittle the importance of the raised seed-bed and the strong and healthy seedlings it produces.

Knowing the high seed-rate in India, we had recommended a cautious seed-rate of up to 20 lb. per acre. We are in a position now to say that almost nowhere the seed-rate need exceed 10 lb. per acre, and this is a fact of very vital importance as our stocks of good seed are limited. If we utilize the available quantity of good seed at the rate of 60 to 150 lb. per acre, it will cover only a small portion of our area. If, on the other hand, we resort to the Japanese method on a large scale, our good seeds will go from 10 to 15 times as far and also yield more healthy seed for the next year.

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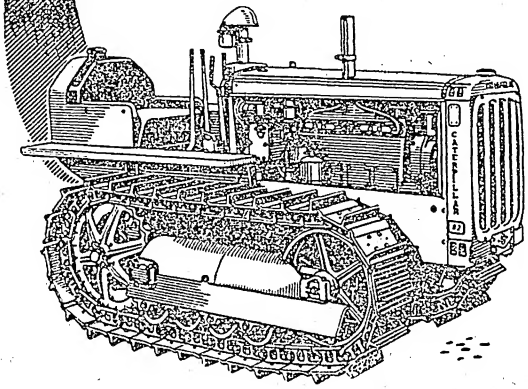
POWER that Grips the Ground

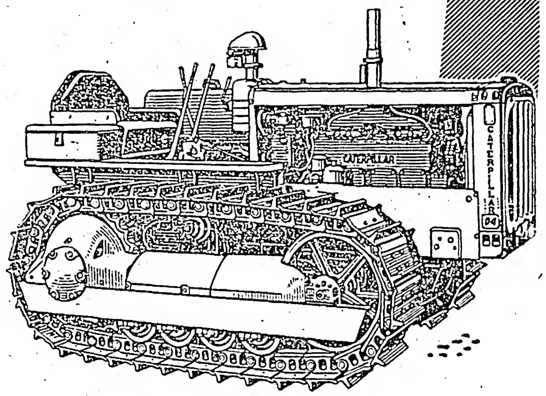
Caterpillar

D2 Tractor



32 HP on Drawbar, 38 HP on Belt

D4 Tractor



43 HP on Drawbar, 48 HP on Belt

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Indian Farming

Vol. IV MAY 1954 No. 2

IN THIS ISSUE

SUBSCRIPTION RATES

Annas 12 per copy — Rs. 9-0-0 for 12 issues — Rs. 4-8-0 for 6 issues

ADVERTISEMENT RATES

CASUAL :		CONTRACT CONCESSIONS : 6 Insertions	12 Insertions
Full Page	Rs. 450/-	Rs. 400/-	Rs. 350/-
1/2 Page	Rs. 225/-	Rs. 200/-	Rs. 175/-
1/3 Page	Rs. 150/-	Rs. 150/-	Rs. 120/-

Printed at Swan Press of Lahore Sadar Thana Road, Delhi-6.

EDITOR'S PAGE

CATTLE SHOWS

FOR the first time this year, the All-India Cattle Show was held amidst rural settings and drew unprecedented crowds. The response from the exhibitors was also good, inspite of the several inconveniences they had to face. Both from the point of view of the number of cattle exhibited and the number of visitors to the Show, it was a great success.

The excellence of the various breeds exhibited proved that given the necessary "know-how" and the right incentive, the Indian stock-breeder could achieve very good results in breeding better cattle.

The improvement of cattle in the country has engaged the serious attention of Governments, both at the Centre and the States. But owing to several difficulties, the process is bound to take time. Of the many handicaps met with in cattle improvement work, none is more formidable than the general ignorance of the average villager in the right techniques of breeding, rearing and management of stock. Research is adding every year more and more results of practical importance in the field of animal husbandry, and unless these results reach the villages, the process of cattle improvement is bound to be slow. In the dissemination of information, especially when a majority of the people are illiterate, no medium can be as effective as a show or an exhibition. It is here that the rural visitor can see for himself what can be done in the work he is most vitally concerned, and carry back with him new ideas to the farmstead and the village.

Cattle shows can thus become an important occular demonstration of what can be done in cattle breeding and management. Apart from this educative aspect, it can provide the necessary incentive to do better with cattle breeding by inculcating a healthy competitive spirit amongst breeders.

Cattle shows can also be utilized for bringing to the notice of the villager what characteristics are most desired in each breed, and how to develop these characters in them. They can also be taken advantage of for telling the buyer what to look for in buying stock for the farm or the dairy.

Since cattle form an integral part of our agricultural economy, cattle shows can as well be used for demonstrating improved techniques of farming. The better the land returns, the better will be the condition of farm or dairy cattle. The demonstrations on improved farming methods held on the Bahadurgarh Cattle Show grounds this year were very instructive and well-attended.

The All-India Cattle Show Committee has shown what can be achieved through the holding of cattle shows on an all-India basis. The benefits of shows of this kind have to be extended to the far corners of the country, for creating in the people a sense of importance of raising the standard of our cattle, and also telling them how this can be done. This, however, can not be achieved by one organization alone. It is here that all those who have cattle improvement at heart can lend a hand to the State and make more shows and exhibitions possible in all the important cattle-breeding areas of the country.

MINERALS FOR MILCH COWS

By

DHARAM PAL,

Technical Assistant, Punjab Government Dairy Farm, Chandigarh

WITH every pound of milk produced by the cow, it loses certain quantity of mineral substances. The more the quantity of milk produced, the greater is the draw for these minerals on the cow. Calcium and phosphorus are the more important minerals required.

Research workers in the United States have found that for the production of every gallon of milk, 7 grammes of phosphorus and 9½ grammes of calcium are required.

It is obvious, therefore, that milch cows should have adequate quantities of these minerals in their food. However, as milch cows are fed extra concentrates in the form of milk ration, they are unlikely to suffer from phosphorus deficiency, as the concentrates are normally rich in that element.

One deficiency dairy cattle may suffer from is that of calcium. On the military farms in India, this difficulty is got over by feeding the milch cattle with limestone daily. This is given when leguminous fodder does not form approximately half of the fodder ration for three months or one-fourth for six months.

Milch-stock yielding 10 to 40 pounds of milk per day receive one ounce of limestone for every gallon of milk produced by them and those yielding over 40 pounds a day receive 4 ounces of limestone.

Sodium chloride is another mineral necessary for milch cattle. If rock salt licks are provided for the cattle, there will be no chance of the animal body running short of this mineral.

Man of the Month

DECCAN FARMER WHO MADE FARMING PAY BETTER

Shri Dagdoo Ganpat Jadhav

IMPROVEMENTS THAT TURNED AN AVERAGE PIECE OF LAND INTO A MUCH-PRIZED FARM

SOME years ago, when the Bombay State Department of Agriculture wanted to select a farmer nearabout Poona on whose farm it could run a demonstration centre, the District Agricultural Officer had no hesitation in naming Shri Dagdoo Ganpat Jadhav of Kunjirwadi as the most suitable one.

The Department wanted such a farmer to be progressive in his outlook, ready to adopt improved practices suggested by the Department in his cropping methods, be able to understand and explain to fellow farmers the improvements brought about by him and make the farm available for holding demonstrations and farmers' meetings.

Dagdoo Jadhav, coming from a hardy stock of Deccan farmers, has been on farming all his life. 'When first I took up the Kunjirwadi farm some thirty years ago,' the sturdy sixty-one-year old farmer told me, when I visited his farm sometime ago, 'it was a parcel of land that you can come across anywhere in Kunjirwadi'. Kunjirwadi is about 20 miles from Poona, on the Poona-Sholapur Road.

Jadhav's farm, like other Kunjirwadi farms, has a soil varying from medium black to light and is of average fertility. The crops raised are, in order of importance, *jowar*, wheat, gram, maize, potatoes and peas. Crops get the benefit of canal water, and two excellent wells augment the water supply.

Farmer Jadhav was first fired with the desire to take to improvements when he paid a visit to the Poona Agricultural College and farms years back. Later, he contacted the extension officers for paying a visit to his farm and suggesting what he should do to do better with his farming. Within a few years by following intensive and timely cultivation practices he was able to get better returns from the land, and extend the area of the farm. Now it stands as a compact block of twenty acres.

The farmer, having set his heart on improved farming, gladly agreed to the proposal of the Agricultural Department to convert the farm into a demonstration centre for the taluka.

CONTOUR BUNDING

'The very first thing I was asked to do was to contour bund my entire farm', said Jadhav. 'I was told of contour bunding being one sure means of putting an end to soil erosion.'

One added advantage of such bunding which he could soon see on the farm was that the soil held water for a longer time, which ultimately benefited the crops.

Next the extension men drew up a new cropping programme for the farm to suit the soil and weather conditions.

According to this programme, the farmer was to follow this schedule :

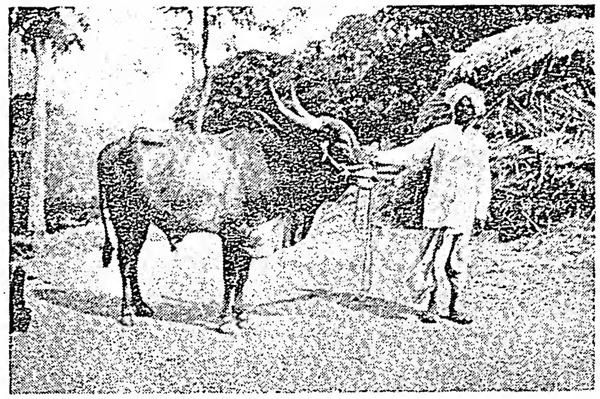
	First year	*Second year*	*Third year*
Kharif	Cereals	Legumes	Cereals and legumes
Rabi	Legumes	Fallow	Fallow
Hot-weather	Fallow	Vegetables	Vegetables

BETTER SEED

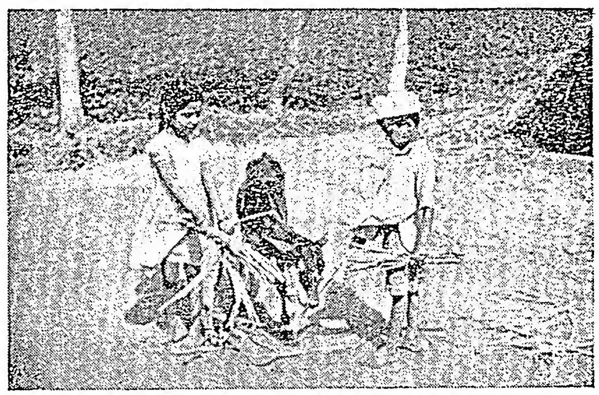
Farmer Jadhav has been convinced of the benefits of using improved seed for sowing. For *bajri*, he uses the well-known 'Akola' variety recommended by the Department. M-35-1 variety of *jowar*, Kenphad variety of wheat and chafa variety of gram are the other seeds used.

'I have watched the yields going up with the use of improved seed on the farm'. the farmer told me. 'On a rough estimate I can say that the seed has given me about 15 per cent increase in yields.'

Visiting farmers have always been impressed with the good stand of crops on Jadhav's farm because of better seed. As a result, the demand for such seed has been on the increase. Last year, the Agricultural Department sold over 570 maunds of improved seed to Jadhav's neighbours.

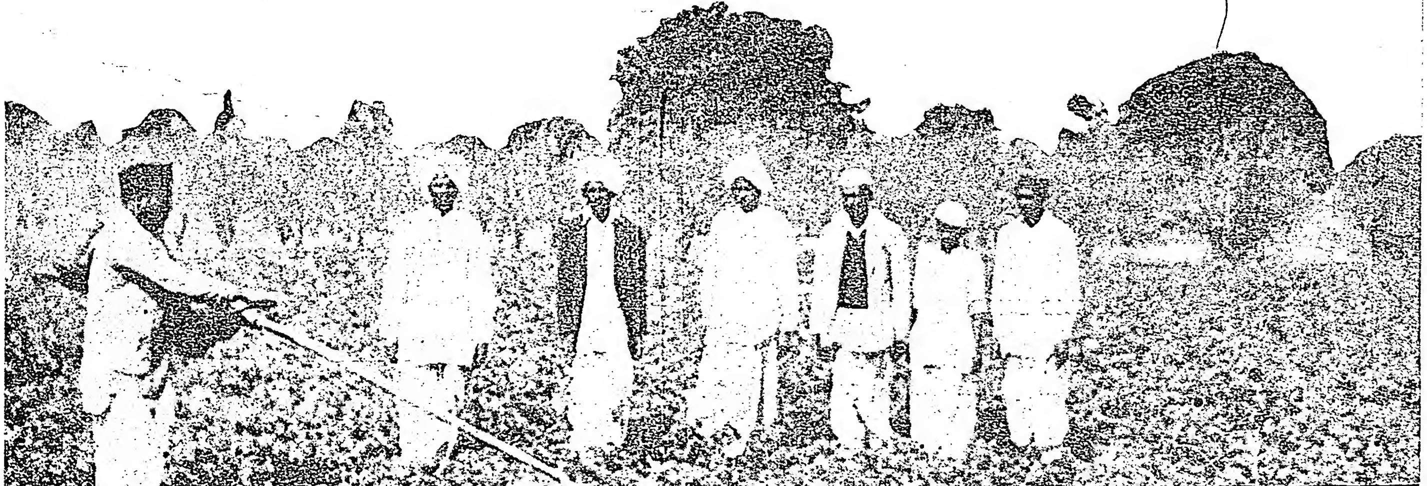


Dagdoo's son proudly shows the Khillar Bull maintained on the farm



The farmer's grandchildren love the farm animals, and like to feed calves and the poultry birds

A dusting demonstration in progress at the Kunjirwadi Farm



Father and son pose in front of the excellent crop of jowar they have raised

COMPOST FROM FARM WASTE

Jadhav is a great enthusiast of compost. 'There was a time when we did not know how to dispose of so much of crop waste that was accumulating on the farm. Now composting has shown us an admirable way of disposing of farm waste, as well as enriching the soil with excellent manure.' he said. The farmer showed me the two pits he had dug, one of which had been filled.

Jadhav's neighbours are following this good example. 'You can see for yourself that composting has come to stay in Kunjirwadi. Over a hundred farmers here are regularly preparing compost from farm wastes', said the farmer with a smile.

Composting supplements the farmyard manure which Jadhav preserves with care. So do his neighbours. There are no unseemly dung heaps or pools of urine to be seen near the cattle shed. I asked him his experience about artificial manures.

'Five years ago' he replied, 'we did not know of artificial manures in this part of the country. I began, on the advice of the Agricultural Department, using manure mixture, ammonium sulphate and superphosphate for my grain and fruit crops with good results. Now these have become popular with other farmers as well.'

TREATED SEED

Jadhav has his seed treated before sowing. Sulphur treatment is given to *jowar* as a precaution against *jowar* smut and paddy seed is treated with perenox to guard against blast. Paddy, the farmer explained, was not a usual crop of the area. But the Department suggested a trial, and four years ago Jadhav tried paddy on his farm with very good results. Ever since then paddy has come into the cropping scheme of many of the farms of Kunjirwadi. Jadhav introduced potatoes last year, with equally good results.

GROWING PEAS

Peas are yet another crop recently introduced. The crop has been giving such a good stand and good returns that it is spreading fast in the neighbourhood.

'We were growing peas, and were very much discouraged by the results obtained. We used to get one picking from the crop with the yield at about 30 maunds', interrupted Jadhav's son, who is now at the helm of affairs at the Kunjirwadi Farm, 'but when the Department taught us sulphur-dusting against pea diseases, we could get as much as 200 maunds of green peas in six pickings'. In fact, peas were very much in evidence for miles around Kunjirwadi.

The farmer took me round his modest 1/2-acre orchard. Farmers here do have custard apples in ones or twos on their farms. This farmer tried it on a ½-acre plot.

I was surprised to hear that this small bit of land bearing custard apples gave as much as Rs. 3,000 a year to the farmer. 'Beyond giving a cartload of farmyard manure for every 20 plants, and copiously irrigating them, I hardly pay any attention to my orchard' he dislosed.

'I owe the high returns to my second son who is in Bombay' confessed the farmer. 'It is he who procures the best price for the produce. He is good in marketing farm produce.'

The farmer also showed me some old mango trees side-grafted. The side-grafts showed good flush. 'This is one of the most profitable things every farmer should know. It is as good as putting in a new life in an old plant', Jadhav said.

And lastly, farmer Jadhav showed me his prize possession. It was a Khillar bull, of very good proportions. It is being maintained by Jadhav for the benefit of the neighbourhood. His services are free.

Farmer Jadhav's Kunjirwadi farm is one of the most-priced farms in the area. He himself is held in great esteem by his neighbours, who seek the advice of this 'man of improvements' on agricultural matters. By taking to improved farming he has shown how farming can be put on sound lines. The Kunjirwadi Farm is a treat to see to all those who love farming.

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Insect Pests of the Coconut Palm and their control

By

E. S. NARAYANAN,

Head of the Division of Entomology, I. A. R. I., New Delhi

WITH about one and a half million acres under coconut, India has the second largest coconut-producing area in the world, yielding about 3,400 million nuts annually. Yet our production falls short of our requirements by about 25 per cent. One of the main causes for this deficiency is the serious damage caused by insect pests.

Although more than a dozen coconut pests have been reported in India, only three of them are considered of major importance. It must, however, be emphasized that even a minor pest is likely to assume the status of a major pest under favourable environmental conditions. It is the few that lurk here and there unobserved that multiply in geometrical progression and cause the major insect outbreaks. As Munro rightly observes, "One of the axioms of economic entomology is that, like the poor, injurious insects are always with us, and outbreaks of insects rarely arise by a sudden invasion from some distant quarter, but are the direct result of the steady increase of the ever-present but unobserved few."

The major and minor insect pests of the coconut palm are given below :—

Major pests :

1. The rhinoceros beetle (*Oryctes rhinoceros* L.)--Coleoptera: Dynastidae
2. The red palm weevil (*Rhynchophorus ferrugineus* Fb.)—Coleoptera : Curculionidae
3. The black-headed caterpillar (*Nephantis serinopa* Meyr.)—Lepidoptera : Crytophasidae

Minor pests :

1. Leaf-eating caterpillar (*Gangara thyrsis*)—Lepidoptera : Hesperiadae
2. Leaf-eating caterpillar (*Suastus gremius*)—Lepidoptera : Hesperiadae
3. Slug caterpillar (*Parasa lepida*)—Lepidoptera : Limacodidae
4. Slug caterpillar (*Contheyla rotunda*)-Lepidoptera : Limacodidae
5. Slug caterpillar (*Natada nararia*)—Lepidoptera: Limacodidae
6. Flower-eating caterpillar (*Turnaca acuta*)—Lepidoptera : Notodontidae
7. Flower-eating caterpillar (*Coconympha iriarcha*)—Lepidoptera : Gelechiadae
8. Flower-eating caterpillar (*Batrachedra arenosella*)—Lepidoptera: Cosmopterygidae
9. The bug (*Stephanitis* sp.)—Rhynchota : Tingididae
10. Scale insect (*Aspidiotus destructor*)—Rhynchota : Coccidae
11. Scale insect (*Vinsonia stellifera*)—Rhynchota: Coccidae
12. Scale insect (*Pseudaonidia trilobitiformis*)— Rhynchota : Coccidae
13. The red ant (*Dorylus orientalis*)—Hymenoptera: Formicidae
14. Termites
15. An unidentified aphid
16. An unidentified Scolytid beetle borer

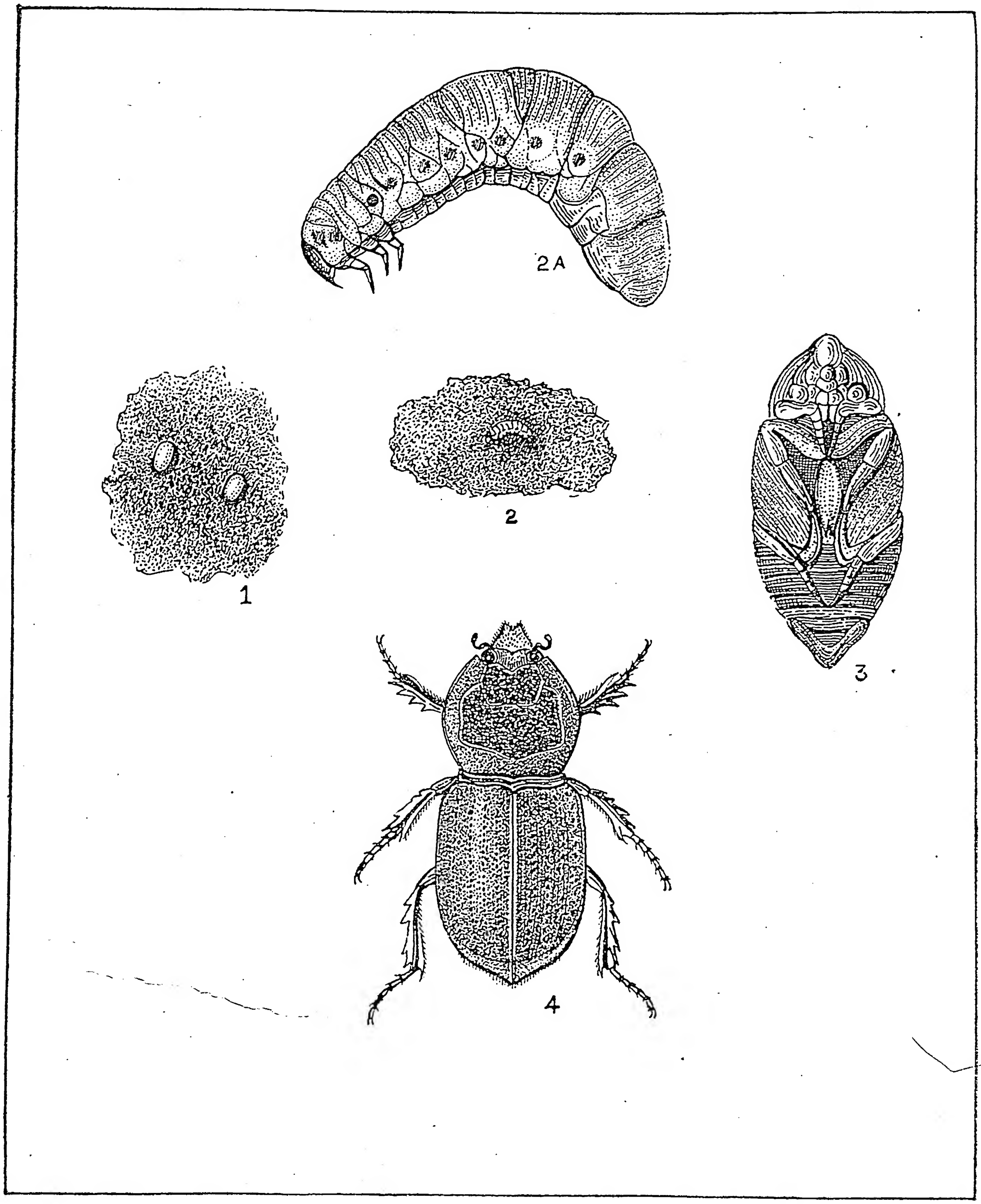
MAJOR PESTS

THE RHINOCEROS BEETLE

This is a serious pest of coconut as well as other palms throughout Travancore-Cochin, Madras, Orissa, Bombay, Saurashtra, Bengal and Assam. Outside India, the pest has been reported from the coconut-growing centres like Burma, Ceylon, Singapore, Java, Sumatra and the Philippines. A stout black beetle with a pointed horn, this pest causes serious damage by boring into the unopened fronds. The series of holes bored by this beetle are characteristic of the damage caused by it. When the damage extends to the growing point the tree dies off. The damage is most severe in the case of young plants, and the loss caused by this pest is sometimes really very great. It may be interesting to know that while the actual breeding of this pest takes place in the decaying vegetable matter, rubbish heaps, or farmyard manure heaped here and there in the plantations, the adult pest passes most of its life-time in the crown of the palm by feeding itself on its sweet sap.

Habits and habitat : The beetle lays eggs in clusters in manure heaps. Each cluster contains 48 to 152 eggs. The egg is 3 to 4 mm in length and 6 to 7 mm. in breadth. The incubation period varies from 10 to 15 days. The newly-hatched grub measures 6 to 7 mm. in length. The full-grown grub measures 75 to 125 mm. long and 20 to 30 mm. broad. Pupation takes place in the soil at a depth varying from six inches to four feet in the manure pits. Rarely a few grubs pupate in the crevices of the palm-trunk, inside a cocoon. The pupa is 50 to 70 mm. long and 20 to 25 mm. broad. The adult beetle remains in the cell for quite a long time after emergence, the period sometimes extending up to a month. It measures 35 to 50 mm. in length and 14 to 21 mm. in breadth and is conspicuous by its pointed horn, which is more prominent in the case of the males. The adult beetle is long-lived and has been observed to live for six months. The females start laying eggs 20 to 60 days after emergence and always select some decaying organic matter for oviposition. The larval period varies from 75 to 152 days and the pupal stage lasts from 15 days to one month. The palmyra palm, the toddy palm and the oil palm are its important alternate hosts.

Control measures : The rhinoceros beetle presents a very baffling



ORYCTES RHINOCEROS L.

1. Eggs
2. Freshly-hatched larva

2A. Full-grown larva

3. Pupa
4. Beetle

problem not only to the coconut industry but also to the entomologists entrusted with the task of effectively controlling the pest. The most effective and suitable method of its control is a very controversial subject and much research work has yet to be done, especially on the ecological studies of the beetle before we can formulate suitable control measures. Up till now more stress has been laid on preventive measures. More attention has been paid within recent years on the use of the recently discovered organic insecticides like BHC and DDT for the control of the pest. Nirula and others have found the use of BHC very effective for the control of the beetle grubs. As regards biological control, a green Muscardine fungus, *Metarrahizium anisopliae* Metch. is known to parasitise the grubs of this beetle and is reported to have been used with success in Ceylon as an effective means of controlling this pest, but the attempts so far made by the Kayangulam Research Station have not yielded any encouraging results. The introduction and establishment of some exotic predatory Scolid wasps from Malaya and Zanzibar offer perhaps a promising method of controlling this pest.

THE RED PALM WEEVIL

The red palm weevil is probably the most destructive pest of coconut and other palms. Toddy drawers, by the cuts that they inflinct on the palm to draw liquor, unconsciously help this pest in its attack. The initial damage caused by *Oryctes rhinoceros* also helps the pest in whose evil company it is oftentimes observed. It is reddish-brown in colour and cylindrical in shape. It is widely distributed throughout Southern India, Assam, Kanara and Bombay. The weevil has also been observed at Pusa (Bihar). Outside India, it has been reported from Ceylon, Sumatra and the Philippines. In the Indo-Malayan region a similar weevil, but of different species, is also found.

Unlike the rhinoceros beetle the whole life of this pest is spent on the palm tree. If a cut is not available to facilitate the start of its life-cycle, the female would scoup out a small hole by means of its snout on the softer portions of the stem and lay an oval whitish egg in the cavity thus caused. As a matter of fact, several such eggs are laid in separate holes. When these eggs hatch out, the small grubs start feeding on the soft tissues of the tree and often cause a very severe damage, at times killing the tree outright. The decaying organic matter of the dead trees affords the growing grub a very suitable medium for its development and ultimate emergence as an adult. The Indian species breeds throughout the year and has been observed in different localities at different times. On an average, the life-cycle occupies about two months.

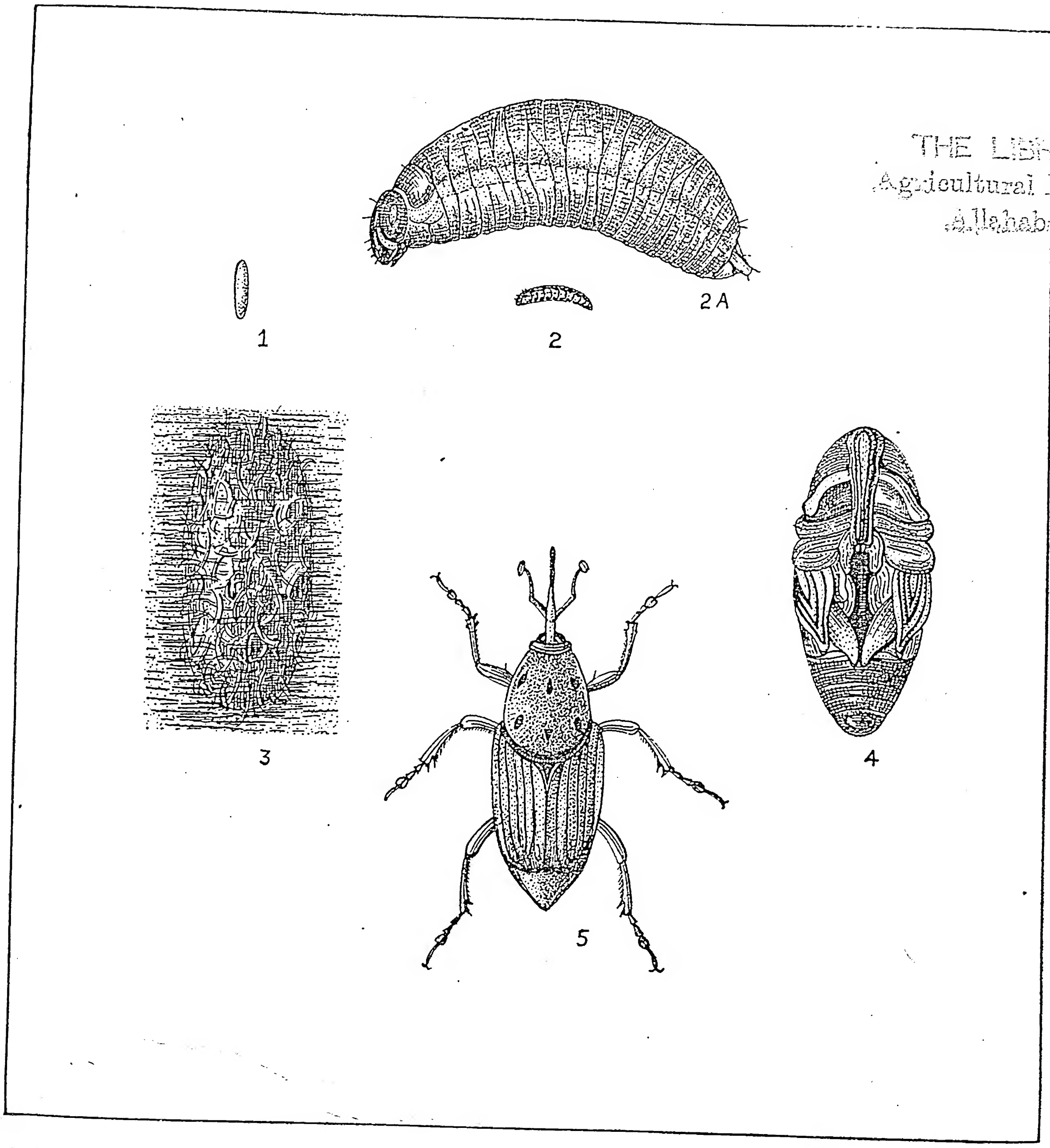
Habits and habitat : The egg which is 2.5 mm. long and 1.25 mm. broad is shiny, creamy white and oval-shaped, and is laid inside a hole scooped out in the palm. The eggs hatch in three to four days in summer; in winter the incubation period lasts a little longer. The freshly-hatched grub is 3 mm. long and pale yellow in colour with no legs. The full-grown grub is as big as 75 mm. in length and 20 mm. in thickness, and is a match to the stately, tall, coconut tree. The full-grown larva builds an oval cocoon under which it pupates inside the stem and the pupa measures about 30 to 32 mm. in length. It generally takes 18 to 33 days for the grub to develop into an adult beetle. The adults are shy of light and are capable of long-distance flights. They are known to live up to a period of about three months. In South India, the weevils have been found getting an easy access to the soft hearts of the tree about the month of May when the rhinoceros beetle is still doing damage. The insect is more common on the date and sago palms, and as compared to the rhinoceros beetle, is found in less numbers on the coconut palm.

Control measures : The method of control so far adopted is almost similar to that of the rhinoceros beetle as they are generally associated together. A great field for further research also exists in exploring its natural enemies and studying the possibilities of the biological control of this pest. The use of DDT and BHC may also be a useful adjunct to the other methods of control. But further experimental work in this direction is absolutely necessary before they can be recommended as a routine extension method to control the pest.

THE BLACK-HEADED CATERPILLAR

This pest is found on the coastal plains of South India, from Konkan to Travancore in the west, and from South Madras to Northern Circars, Orissa and Bengal in the east. In the north, it has been reported up to Patna (Bihar). The pest is fortunately absent in the Mysore Plateau. It is also a serious pest in Burma and Ceylon. It is a micro-moth of the family Cryptophasidae and causes extensive damage to the coconut fronds while in the larval stage, oftentimes bringing about a steep fall in the production of nuts. It also causes the nuts to fall from the trees when they are still young and immature. The larvae of this pest feed on the lower surface of the coconut fronds under galleries of silk which the caterpillar spins. When the attack is serious, the whole frond turns grey and the tree looks completely scorched up. Fortunately, the damage caused by it is localised and hardly a tree is found to die completely due to its attack alone. The period of the maximum development and activity of the pest is from April to May and the pest thrives well during drier months. The moths are ashy-grey in colour and usually rest on the under-surface of the leaves. They are fairly active after dusk.

Habits and habitat : The female moth usually commences egg-laying within a day or two of its emergence and the eggs are invariably laid on the under-surface of the pinnate leaves in scattered clusters numbering from 100 to 350. Each egg measures 0.3 to 0.6 mm. and is elliptical in shape and yellowish in colour. The hatching period is about four days in summer and six to eight days in winter. The freshly-hatched larva is about 1.5 mm. long and pale white in colour, while the full-grown larva measures 18 to 20 mm. in length and 2 to 2.5 mm. in breadth. The larva moults five times before it pupates and the larval period occupies about 36 to 54 days. Pupation takes place in the larval gallery under a whitish silken cocoon. The pupa which is brown in colour is 9 to 10 mm. in length. The pupal period varies



RHYNCHOPHORUS FERRUGINEUS FB.

1. Egg
2. Freshly-hatched larva
2-A. Full-grown larva
3. A cocoon in the stem of a palm
4. Pupa
5. Weevil

from 9 to 12 days. The female moths genarally live up to six days. The whole life-cycle covers 55 to 78 days. Besides the coconut, it has got many alternate hosts of which the palmyra, the talipot and the wild date-palm are worth mentioning.

It may be emphasized that this pest was first discovered in Madras in the year 1902 on palmyra leaves in the vicinity of Coimbatore only, and in spite of the enforcement of the Madras Agricultural Pest Act of 1919 it has gradually spread on the western coasts of the densely coconut-cultivated areas of Mangalore, Malabar and Travancore-Cochin. Steadily the pest has spread to Orissa and Bengal in the east, Bombay and Poona in the west and as far as Patna in the north. It is thus evident that this pest is capable of spreading rapidly over wide areas and today the loss to the coconut-growers is considerable on account of the depredations of this pest.

Control measures : The gap in our knowledge on the control of this pest is rather wide, excepting that this pest has got a number of natural enemies that normally keep it under check. The only method that can be recommended is to cut down all infested fronds and destroy them. This method though found fairly satisfactory often leads to re-infestation by this pest. The only course left, therefore, is to mass-breed some of the promising parasites like the *Perisierola nephantidis* (larval) or *Trichospilus pupivora* (pupal) and liberate them when the infestation is very high. Spraying of infested plants with 0.2 per cent DDT is reported to have given satisfactory results. It must, however, be emphasized that this insecticide has to be used with great caution as otherwise it will also destroy the beneficial parasites.

The parasite fauna on the east coast comprise mainly of :

(1) *Apanteles taragamae* (Braconidae)—larval

(2) *Perisierola nephantides* (Bethylidae)—larval

(3) *Elasmus nephantidis* (Elasmidae)—pupal

and 4) *Stomatoceras sulcatiscutellum* (Chalcididae) – pupal

The parasite fauna on the western coast comprise mainly of :

(1) *Trichospilus pupivora* (Eulophidae)—pupal

(2) *Microbracon brevicornis* (Braconidae)—larval

(3) *Elasmus nephantidis* (Elasmidae)—pupal

MINOR PESTS

Very little is known about the minor pests as these have not so far caused any appreciable damage to the coconut palm. Therefore, a brief and passing survey about each of these pests is made below :

Gangara thyrsis : This is a leaf-eating butterfly caterpillar occasionally found feeding on the folds of coconut leaves, especially on young plants. Removal of badly affected leaves in young plants is the only suitable method of control known so far.

Suastus gremius: This is a pest, chiefly of the palmyra palm, but occasionally found on the coconut also. Hand-picking of the larvae in young plants is the only suitable measure of control.

Parasa lepida : This is a leaf-eating slug caterpillar that sometimes causes serious damage. At times even large palms are affected by this pest. Cutting and destroying of the affected branches is a good method of control.

Contheyla rotunda : This is also a leaf-eating slug caterpillar, the larva damaging the foliage and sometimes the flower shoots and rinds of young nuts. This pest is very common in certain parts of South Malabar and Cochin. Cutting off of the attacked fronds is a good method of control.

Natada nararia: This is another leaf-eating, spiny slug caterpillar doing some damage to the coconut palm. It is more common in the Godavari delta.

Turnaca acuta : This is a minor caterpillar attacking flowers.

Coconympha iriarcha: This caterpillar also attacks the flowers.

Batrachedra arenosella: This also causes the same damage as the above two.

Stephanitis sp. : This is a lace-wing bug, occasionally found on tender leaves. It appears in very small numbers and the damage caused is usually negligible.

Aspidiotus destructor : This scale insect probably occurs throughout the coconut-growing tracts in our country. Sometimes it appears in very large numbers, literally covering the leaves. The vitality of the tree seems to be lowered when the incidence is very high. Careful spraying with some of the modern organic insecticides is perhaps a suitable method that can be taken recourse to for combating an outbreak of this pest.

Vinsonia stellifera : This is also a widely distributed scale insect sometimes appearing in small numbers on the coconut palm.

Pseudaonidia trilobitiformis: This scale insect has not been reported in India so far. The pest was recorded in Colombo on one occasion. As Fletcher says, it may be found in our country also.

Dorylus orientalis : These red ants attack young plants just in the same way as termites do, and can be treated similarly as the latter.

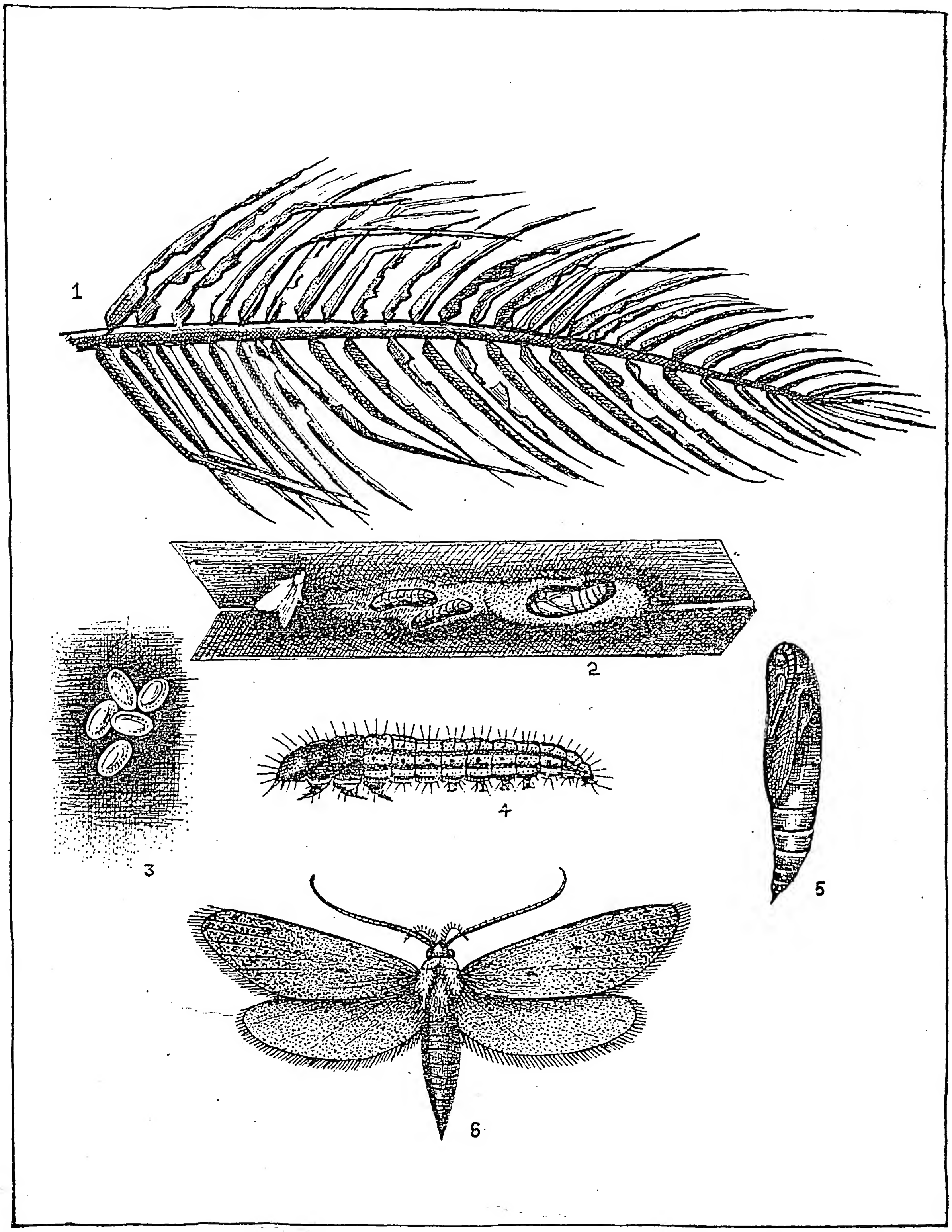
Termites : These are sometimes serious pests of young coco-palms, especially in Malabar. A judicious use of DDT or BHC may perhaps be useful to exterminate this pest. Watering the young plants with a little crude oil emulsion can also yield useful results.

An unidentified aphid : This unidentified aphid was only once found on the young coconut palms at Coimbatore, possibly imported from Colombo. This was, however, promptly controlled.

An unidentified Scolytid beetle borer : This unidentified Scolytid beetle bores into the stem of the coconut palms and is more common in the Negapatam and Godavari districts.

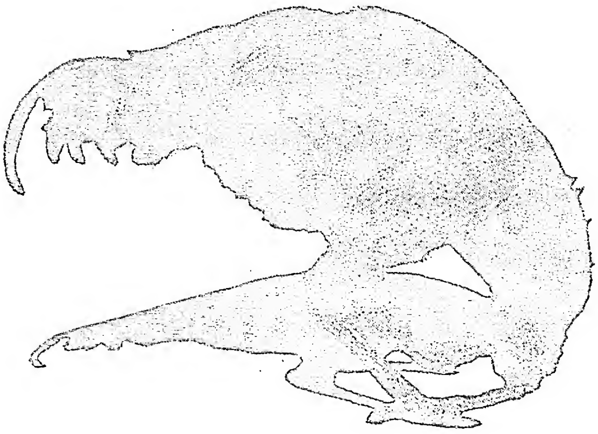
Very recently Nirula and others have recorded a new Cockchafar beetle pest of the coconut palms. As this has been reported for the first time and only very recently, it is difficult to categorise it as a major or minor pest.

———



NEPHANTIS SERINOPA MEYR.

1. An attacked frond
2. A section of the leaf showing galleries spun by the caterpillar, a cocoon and a moth
3. Eggs
4. Caterpillar
5. Pupa
6. Moth



A bird suffering from the after-effects of Ranikhet

Bang The Door On Ranikhet

Ranikhet kills fowls as easily as it spreads

By
KARAM CHAND
Professor of Parasitology, Punjab Veterinary College, Hissar

DURING the hatching season of October to April, a large number of fowls in the Punjab succumb to Ranikhet.

The disease has been found to be as serious as it is common. It spreads quickly, is malignant in its nature and causes heavy losses. With the onset of summer, however, it slowly disappears, to appear again in its favourite season next year. In the hills, where the temperature is low and humidity high, the disease occurs even during summer.

Ranikhet is one of the four major diseases attacking fowls in the State. The others are fowl pox, tick fever (Spirochaetosis), and worm infection (Helminthiasis).

The average poultry-keeper labours under the conception that the local breeds are less susceptible to Ranikhet than imported ones. Observations, however, show that indigenous breeds are as susceptible to the disease as imported ones.

In many cases, the poultry-keeper is unable to distinguish between a broody hen and one sick with disease. In both cases, the bird prefers seclusion.

But a careful observation can easily show the poultry-keeper whether a bird is suffering from Ranikhet or not. A bird that has had infection gets high fever, suffers from acute respiratory distress, diarrhoea and partial paralysis of the limbs.

The disease infection is spread through food and water, mainly the latter. In the course of a few days, the excretions of the birds add to sources of further infection. The scratching habit of the birds also helps in the quick spread of the disease.

Sometimes carcasses of birds infected by the disease are eaten, and the unconsumable parts fed to household flocks. Infection generally reaches a healthy flock through broody hens and newly-purchased birds coming from infected areas. Once the disease is introduced in a flock, it spreads rapidly, indicated by a quick succession of attacks and deaths among the birds.

Ranikhet in the flock lasts for weeks at a time, and when it stops, hardly a fowl is left behind.

The disease, however, can be kept out of the flocks by taking proper preventive precautions. Treatment is also available through vaccines. No outbreak of the disease has been reported in systematically vaccinated flocks. Poultry-keepers should take effective preventive measures and keep disease incidence down in a pretty short time.

CANE-GROWING NEEDS TO BE IMPROVED

THE Indian Union possesses two distinct sugar belts, one lying in the tropics and the other in the sub-tropics, the latter possessing the largest area and the heaviest concentration of factories and producing three-fourths of the total sugar in the country.

The sugar industry in India has grown up tremendously since the last few years. Since 1931, the number of factories has risen from 32 to 139 and output from $1\frac{1}{2}$ lakh tons to 12 lakh tons. It is today the second largest national industry, next only to cotton textiles.

In the country, 22 to 25 per cent of the crop is converted into white sugar, the balance being used for *gur* manufacture after meeting the requirements for seed, chewing and stock-feed.

The irrigated acreage under sugarcane varies from 36 to 100 per cent in the various States. Adequate irrigation facilities are necessary to improve production level and ensure proper utilization of manures and fertilizers applied.

Of the total crop grown, barely 18 per cent is manured. Sugarcane areas in Madras are well off in this respect while in this regard Uttar Pradesh and Bihar need to supplement supplies of oilcakes, compost, green manures, etc.

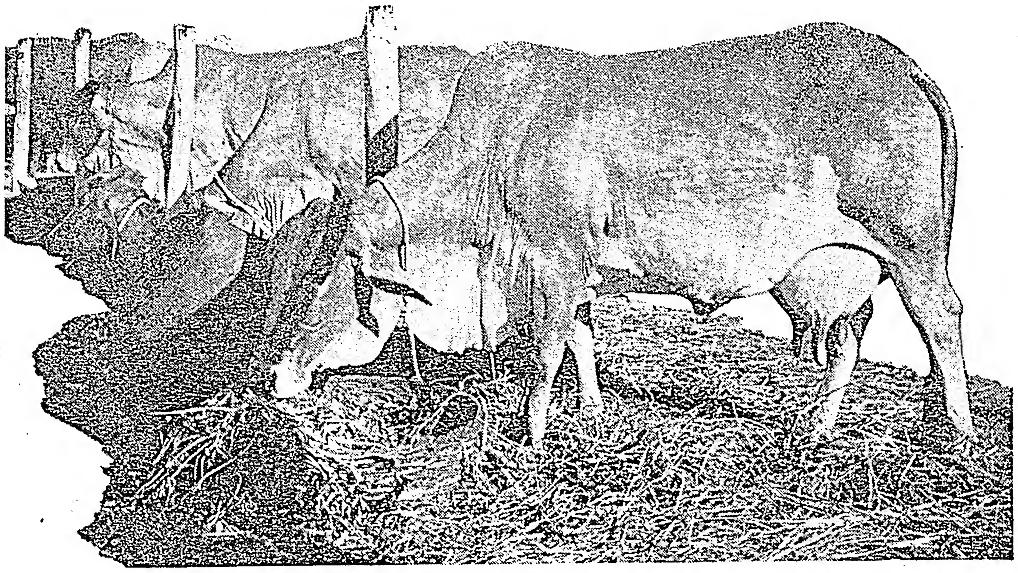
All over the world, sugarcane production has been very largely raised by imbibing scientific improvements. In India, the largest cane acreage lies in the sub-tropical north, where holdings are small, and the grower poor. However, the size of the holdings need not be a bar to high yields, provided the farmer uses good seed, gives adequate and timely cultivation and proper manuring to the crops and takes care to maintain the fertility of the soil.

The industry in Bombay has the unique feature of possessing its own estates and these have shown what the wedding of science and capital can achieve.

Bombay has shown improvements both in acreage and sugar recovery; Madras only in acreage and Uttar Pradesh and Bihar, in sugar recovery but not acre-yields.

The average duration of the factory season has varied from 86 to 234 days, the minima fixed for the sugar belts of the north and the south being 120 days and 200 days respectively.

The by-products of the sugar industry are being only partially utilized and considerable scope exists to develop them towards cheapening the cost of manufacture.



Cattle Show

By **P. L. Jaiswal**

Sahiwal cows of the President's Bodyguard Dairy at the Show

ABOUT 600 head of cattle, representing 19 breeds and 50 sheep and goats were on show at the Twelfth All-India Cattle Show held at Bahadurgarh, 18 miles north-west of Delhi during March last. The number was probably the biggest ever to be seen in any show of the kind held in recent years.

The Show, organised for the first time in a rural location, attracted large crowds of villagers, the last day alone accounting for over a lakh visitors.

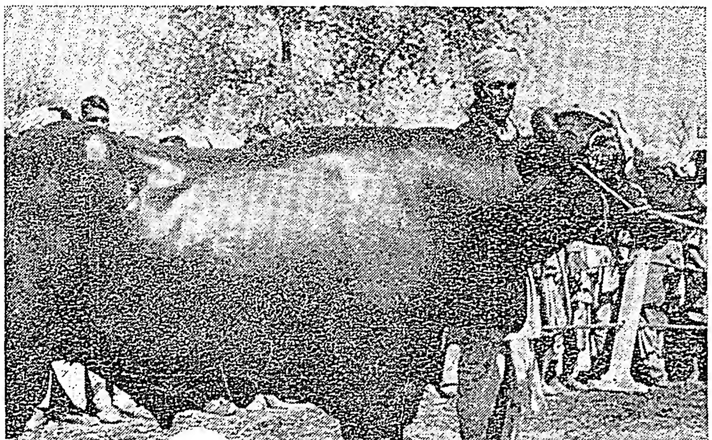
The Show was inaugurated by Dr. Punjabrao Deshmukh, Union Minister for Agriculture, who appealed to the people for a fuller co-operation in nation-building activities such as the development of cattle in the country.

An interesting feature at this year's exhibition was the chain of demonstration centres on improved agricultural and animal husbandry practices. Demonstrations on improved cattle and poultry breeds, preservation of meat and eggs and fish culture in ponds were also conducted.

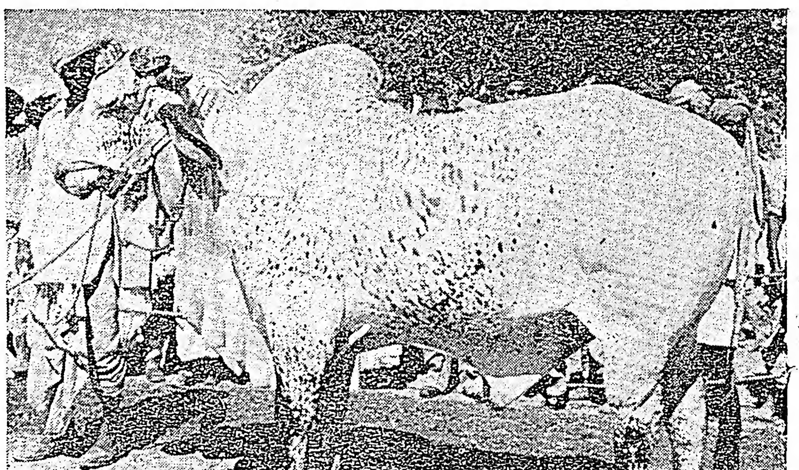
Demonstrations on the Japanese method of paddy cultivation and improved method of sugarcane cultivation were held for the benefit of farmers.

The stall of the Central Inland Fisheries Research Station was equipped with aquaria, charts and diagrams and exhibited the method of cultivation of some of the major carps like '*Rohu*', '*Katla*' and '*Mirgal*' in small village ponds.

The Murrah buffalo which was declared the Best Animal at the Show.



The Deoni Bull that shared honours with the Murrah buffallo as the Best Animal of the Show



at Bahadurgarh

At the poultry demonstration centre, inexpensive incubators, thatched poultry-houses and methods of preserving eggs and canning chicken were effectively demonstrated.

CATTLE SECTION

Practically all the important breeds of cattle were exhibited at the Show. These included the Red Sindhi, the Deoni from Hyderabad, Gir from Saurashtra, Hariana from the Punjab and Delhi, Hallikar from Mysore, Nagori and Rath from Rajasthan and Ongole from Andhra. Two breeds of buffaloes, the Murrah from the Punjab and Delhi and Nilli/Ravi from the Punjab and PEPSU were entered in the Show.

The selection of the Champions and Supreme Champions *viz.*, best buffalo-bull, best buffalo-cow, best bull, best cow, best animal in the Show and also the highest milk-yielder and best draught type bullocks was done during the last two days, and a running commentary of the proceedings helped breeders and visitors in understanding the characters of the various breeds of cattle and the progress made in the judging of cattle. A draught test was held for the first time this year for ascertaining the pulling capacity of bullocks.

PRIZES AWARDED

Prizes were awarded to the best animals in the various breeds, the Champions and Supreme Champions. In all, three gold medals, 78 cups and Rs. 18,276 in cash were distributed to the winners in the various competitions.

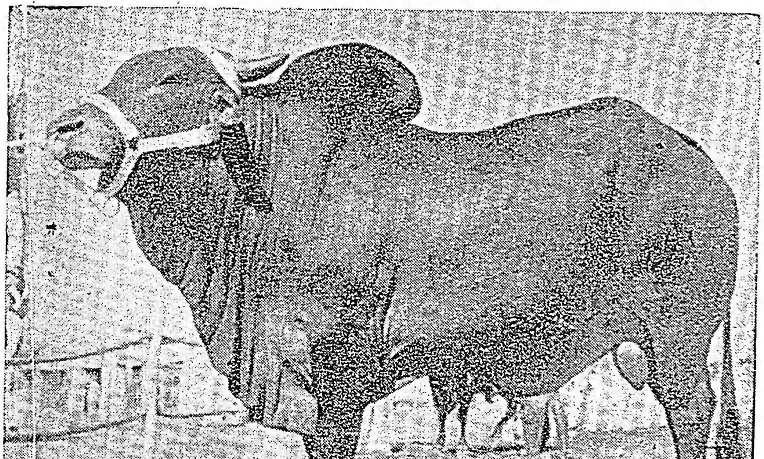
Best animal : 'Lakshmana', a black and white mottled Deoni bull and a Murrah buffalo-bull from Rohtak were the recipients of the title of 'Best Animal' in the Show. The judges found it difficult to choose between the two, and accordingly the award of Rs. 2,000 given by the Central Council of Gosamvardhana was equally divided between the owners of the two bulls.

Besides the above mentioned award, Shri Raghunath, the owner of the Deoni bull got the Marquess of Linlithgow, Hyderabad, Bharatpur and the Times of India Challenge Cups and also cash prizes amounting to Rs. 950. Shri Haradwari Lal, Sarpanch of Gobhana Panchayat to which the Murrah buffalo-bull belonged, also received the Marquess of Linlithgow, Saidulla Khan, Lyallpur and Macguckin Challenge Cups and Rs. 750 in cash on behalf of the Panchayat.

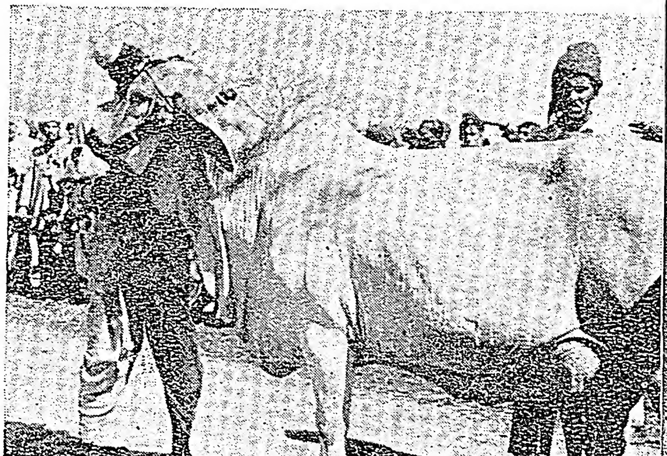
The 3½-year old Deoni bull, 'Lakshman', was graceful and strikingly impressive. It had a well-proportioned body, a robust constitution, an intelligent expression and a majestic bearing. Its massive forehead, drooping ears, fine skin and heavy dewlap were the most characteristic and impressive features. The proud owner of 'Lakshman', Shri Raghunath, told me that besides *kadbi* and green fodder, he fed 3½ seers of gram, cotton-seed, etc. and a little jaggery and salt to the bull every day He said that the bull was capable of serving 100 to 125 cows per month, and that he was charging Rs. 10 per service, and after meeting all the expenses he was able to save Rs. 800 to 1000 per month during the breeding season.

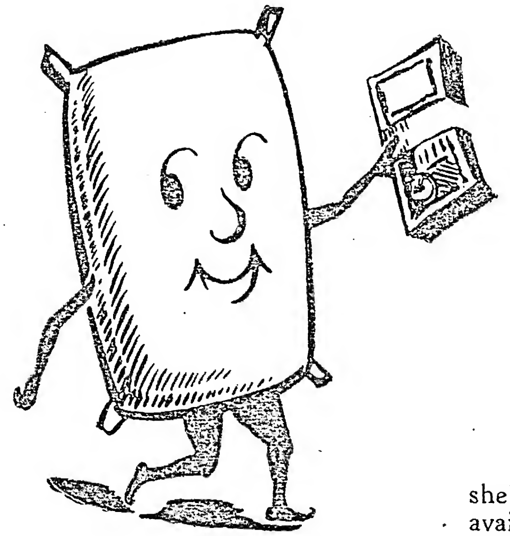
(*Continued on page 29*)

This bull, declared as the best animal of the Red Sindhi breed is from the Military Dairy Farm, Hebbal, Mysore State.



The Hissar Cow that was declared the Best Cow in the Show.





Better Price for Farm Produce

FARM produce does not generally fetch as much price as it should. This is primarily due to lack of proper marketing methods. Efficient marketing alone can help the producer to realise a greater share of the price the consumer ultimately pays for the produce.

For the creation of an efficient market, individuals and organizations will have to work in close co-operation with each other. The farmer, the trader, the consumer and the Government have to put their shoulder together to the wheel.

WHAT FARMERS SHOULD DO

Farmers can assure a better-quality produce by harvesting the crop at the proper stage. As a clean produce fetches a premium in the market, it pays to have produce such as foodgrains and oil-seeds free of chaff, dirt and foreign material. Clean picking of cotton gives a clean lint which fetches more money. Commodities like fruits and vegetables bring better prices if graded before sale.

Some produce requires proper processing for a good market. Paddy has to be hulled and sold as rice, groundnut shelled and sold as kernel and *kapas* ginned and sold as lint. The paddy husk, groundnut shell and cotton seed will also be available as by-products and can be put to such use as fuel, manure and feed.

Market rates are broadcast on the radio, published in papers and put up in many *mundies.* A producer who knows the trend of the market for the various commodities knows when and where to sell his produce with advantage. He will know from the current prices whether he stands to gain by selling his produce locally or by taking it to another market.

Regulated markets guarantee a fair deal to the producer, where open auction and use of standard weights are practised and market charges are pegged down. It pays any producer to take the produce to the regulated market.

Since most farmers are small-scale producers, organizing themselves to pool, process, grade and market their produce on a co-operative basis will be ideal. In this work, they have all support from the Government.

Traders can definitely play an important part in raising marketing standards. They should change their operating methods and take to improved processing of goods, adopt standard contract terms and evaluate the goods on a standard quality basis.

GOVERNMENT'S ROLE

Government's aim is to help those who help themselves. It enacts market legislation. It provides marketing services such as grading and inspection and publicising market news, assists producers' co-operatives, organizes publicity and widens export markets, conducts research on marketing problems and organizes an extension service to acquaint farmers, consumers and market functionaries with the improvements effected.

Consumers can help in bringing about marketing improvements by always insisting on Government-graded products. The success of the grading schemes depends on the full support they receive from the consumers. Look for "Agmark" on the products such as *ghee*, vegetable oils, eggs, fruits, etc. you purchase. "Agmark" symbolises purity and quality.

If you need advice on the marketing of farm produce, contact the Marketing Officer of your State or write to the Agricultural Marketing Adviser to the Government of India, New Delhi.

CORRECTION

March, 1954 issue of "Indian Farming"

The second sentence of the introductory para of the article entitled "Production of Chillies" appearing on page 20, may be read as

"The mild type used for salads, pickles, baking and stuffing is known as pepper. bell pepper or capsicum, or white pepper of commerce, which is derived from the berries of a tropical, woody plant, *Piper nigrum*, whereas chilli, *Capsicum frutescens* belongs to the family Solanacae."

Mixed Cover Crops For The Monsoon

WHERE POSSIBLE, IT WILL PAY FARMERS TO TRY MIXED CROPS DURING THE MONSOON SEASON

MIXED cropping in the monsoon season has four-fold advantages to offer to the farmer. The interspace in the crop is better utilised, cost of interculture is reduced and the moisture conserved in the deeper layers of the soil after the *kharif* cereal or cotton crop is harvested. Mixed cover crops also bring larger profits to the farmer.

Among mixed crops, combinations with *jowar* and *bajra* are more common than with maize when raised for grain. In northern India, *arhar* is the principal companion crop to *jowar* yielding an average of about 12 maunds per acre. *Arhar* has a deep taproot system and as such, makes use of the sub-soil conserved moisture. It also enriches the soil due to the continuous leaf-fall and release of nitrogen from its root nodules' and also makes phosphates available for the next crop.

Moong and *urid* are sown mixed with the *jowar* crop on the lighter types of soils in Uttar Pradesh, Bihar and Madhya Pradesh.

In South India, *moong*, red gram and *urid* are commonly sown mixed with *bajri*, *kodra* and *ragi*, particularly in the drier parts of Madras, Mysore, Hyderabad and Bombay States. In northern and southern Gujarat, as winter rains are seldom received, mixed sowing of *arhar* or castor in rows eight to ten feet apart is practised.

In Madras State, experiments have shown that the combination of the pure *cumbu* crop followed by horse-gram and the combination of red gram mixed with *ragi* followed by horse-gram, give the highest outturn per acre.

In Mysore, groundnut is cropped mixed with *jola*, castor, *sejje* or *tugari* and cotton. Here varieties of a short duration are preferred for such cropping. Raising *ragi* with field bean is also a common practice.

In Bengal, jute is sometimes sown with *aman* paddy. When rice is a subordinate crop and is raised on dry land, it is usual to mix it with *kharif* cereals or *kharif* pulses. The variety of rice used is hard and is able to withstand drought.

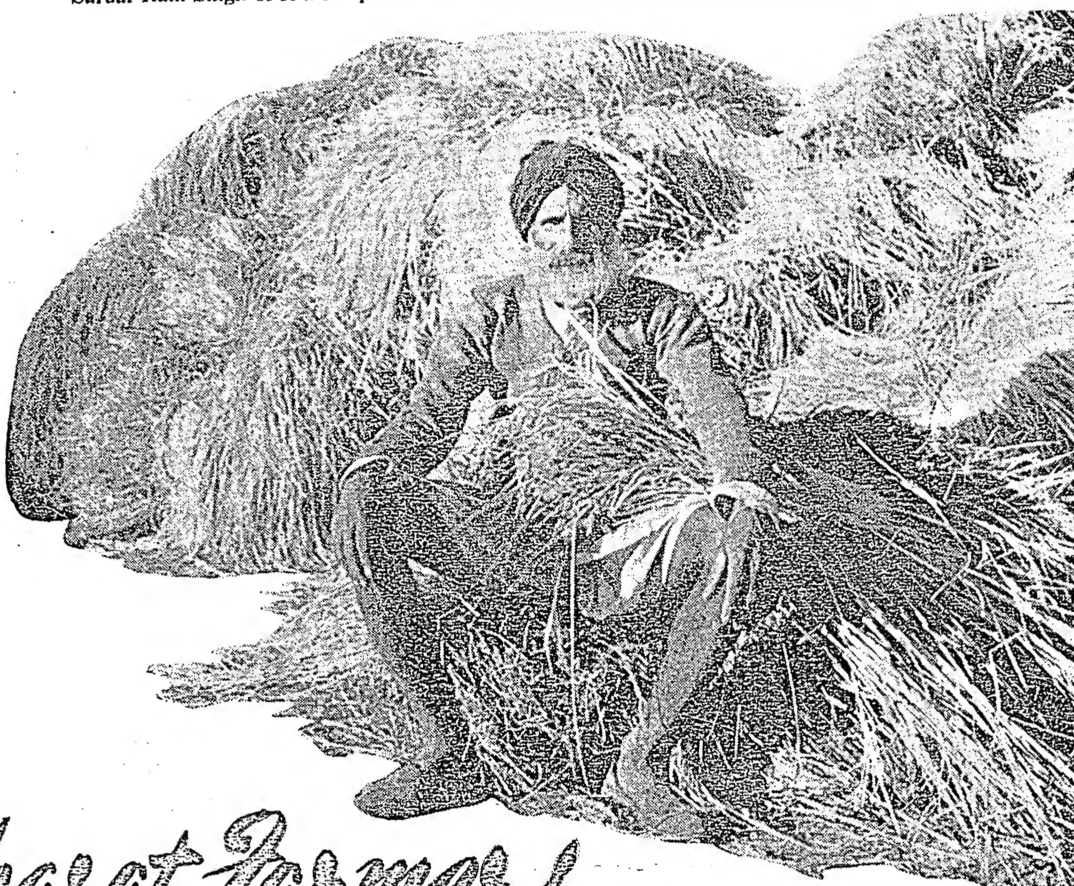
The Italian millet is perhaps the most important of the crops grown as companion to short staple cotton. Among pulses, horse-gram is common in Mysore. *maccai* in the Surat tract, green gram, black gram and red gram in Madras State, and green gram and black gram in Hyderabad (Deccan), Madhya Pradesh and Madhya Bharat. In these three States, groundnut as a mixed crop is getting more popular.

In view of the benefits that mixed farming has to offer to farmers, it is advisable that wherever facilities exist, a better cropping system is adopted and better returns obtained from the land in addition to raising the standard of fertility of the soil.

Extracted from "Double cropping"
(I.C.A.R. Review Series No. 8)
by P. C. Raheja

THE EDITOR
INVITES YOUR QUESTIONS AND SUGGESTIONS.
ADDRESS THEM TO THE EDITOR, "INDIAN FARMING"
INDIAN COUNCIL OF AGRICULTURAL RESEARCH,
NEW DELHI.

Sardar Ram Singh of Rithora poses with the harvest that brought him a per-acre yield of 120 maunds



Japanese System Impresses Madhya Bharat Farmers

By
S. M. WAKANKAR,
Economic Botanist to Madhya Bharat Government, Gwalior

Farmers adopting the Japanese system raised bumper yields of paddy in Madhya Bharat last year. As in the rest of India, the Japanese system has been demonstrated as an affective means of increasing rice-yields in this State too.

LAST year, rice was grown on 15,870 acres in Madhya Bharat by the Japanese system with very encouraging results.

Rice has a minor position among food-crops in the State occupying as it does about two lakh acres, as against 28 lakh acres under *jowar* and 20 lakh acres under wheat. Yet, farmers responded well to the campaign for popularising the Japanese system inaugurated in March, 1953 at Pipandi, a small village near Gwalior in the heart of the compact paddy-block in Gohad Tehsil.

As most holdings on which rice is grown in the State are large, the Japanese system was slightly modified to suit local conditions. For the irrigated crop, the dose of fertilizers recommended was 120 lb. each of ammonium sulphate, groundnut-cake and superphosphate, and for the rain-fed crop the dose was 40 lb. of each of these fertilizers.

Large-scale demonstrations held in all the rice-growing areas helped farmers pick up the technique of the new system easily. Demonstration plots alone covered an aggregate area of 1,532 acres. The salient features of the method such as growing seedlings on raised beds, transplanting seedlings in lines, fertilizer-application and timely and proper interculture of crop were stressed so that farmers could pay enough attention to each one of them. Farmers were supplied with 683 tons of the various fertilizers for application to their rice crops.

Further impetus to farmers to take up the system and pay proper attention to the crops was provided by holding a rice crop competition throughout the State. The entry fee was kept at annas four, so as to be within the reach of all farmers. In all, 507 farmers participated in the competition, and crop-yields were checked by a committee of five. Yields were recorded on 1/80-acre plots.

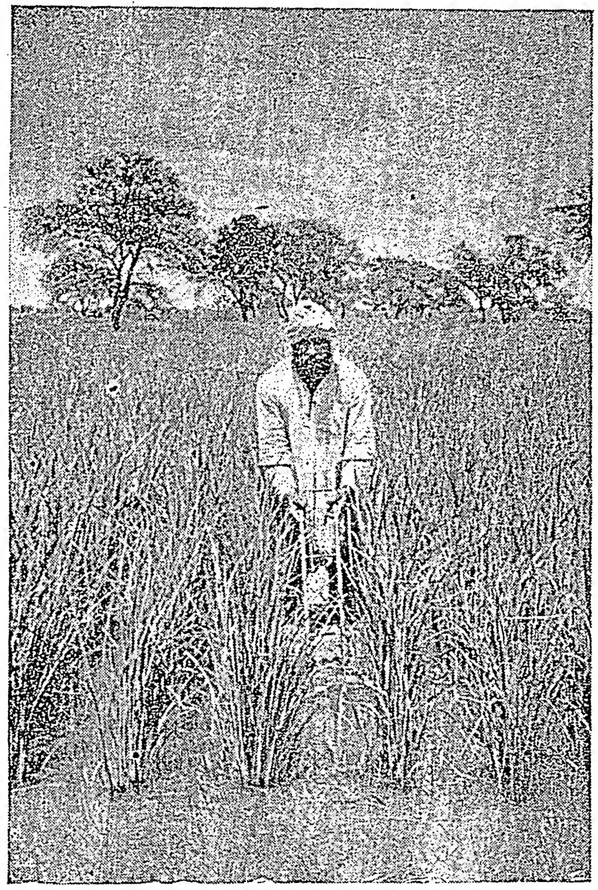
Sardar Ram Singh of village Rithora in Morena district topped the lists for the State by getting an acre-yield of 120 maunds of paddy, followed by Shri Devendra Singh of Birgawan, Gird district with 118 maunds and 10 seers, and Shri Kanhaiyalal Jagannath of village Shampur, Dhar district, with 115 maunds and 5 seers.

Seventy-two of the farmers were awarded prizes for the best performance in their own respective localities at the Convention held in Gwalior in January this year.

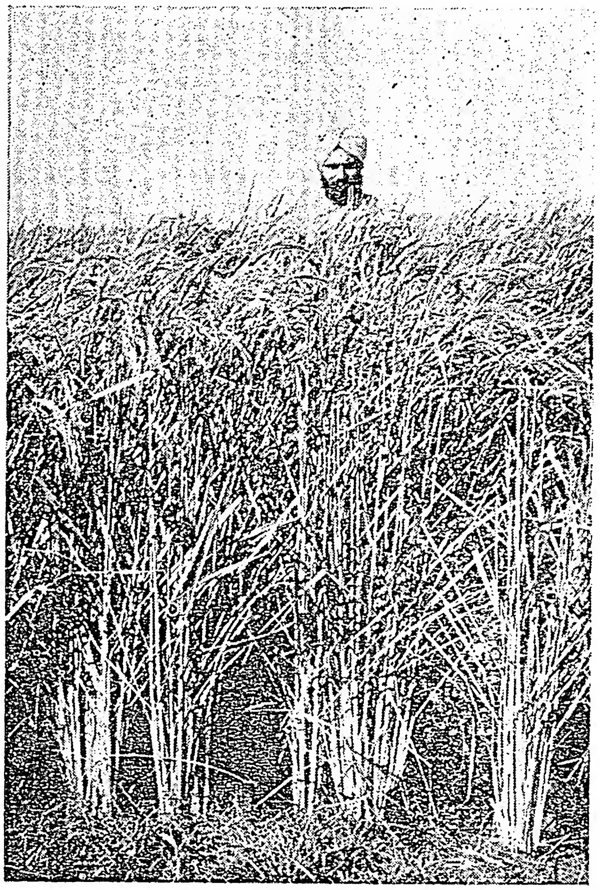
In Madhya Bharat, the Japanese method of rice cultivation proved a success during the last season. Preparations are afoot to push the campaign further in the coming season.

School children helped in holding demonstrations in the Gohad area

Interculturing paddy became popular wherever the system was introduced



A crop raised by the Japanese system in Harsi looked like this



TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

Editor

The Farm Home

Make the most of rice

The housewife should get the best out of rice by following a few easy precautions while cooking

IN a large number of Indian farm homes, rice forms the principal item of diet. Rice is in main a starchy food, giving the body the energy it needs. But that is not all. It contains other important substances too which are badly needed for building the body and keeping it in good health.

Take proteins, for example. Rice has comparatively a small quantity of proteins. These substances are required for growth and the maintenance and repairs of body tissues. Though the quantity of proteins in rice is small, they are in such form that they can meet the demands of the body better than the proteins in many other foods.

Rice, of cource, is poor in fats. But that should be no matter for worry, because fats can be easily had through other sources.

IMPORTANT NUTRIENTS

Of greater importance, however, are the vitamins. Vitamin A is a substance that the body must get in sufficient quantities for maintaining good health. Again, rice has such small quantities of it that the rice-eater has to rely on other foods to get a sufficient quantity of it. But rice contains a good quantity of another vitamin called vitamin B, a substance that the body requires badly. This vitamin is found more in the outer layers of rice and little in the starchy kernel, which is all that remains when rice is milled.

Rice is poor in calcium or lime, which is required, among other things, for the building of bones and teeth.

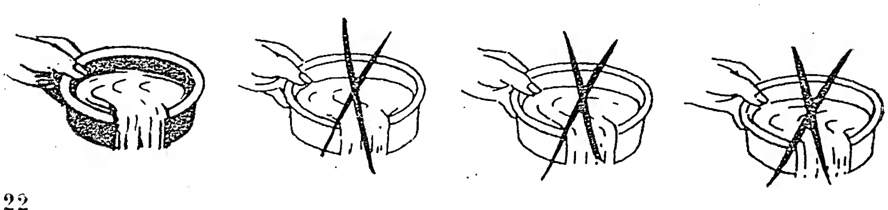
So here are the food factors of rice. Most of these factors are little affected by cooking. But many of them are soluble in water and can for that reason be washed out of food.

And here is where the housewife has to be cautious. She usually washes the rice several times before cooking, and she may even boil it in excess of water, and throw out the water.

Even with the first washing, substances like the vitamins pass into the water, which is thrown away. If rice were to be washed three times, and cooked with liberal amounts of water, much of the iron, almost half the phosphorus and some of the vitamins contained in it are lost.

REDUCE LOSSES

The housewife has, therefore, got to see that such loss of nutrient



substances is reduced to a minimum.

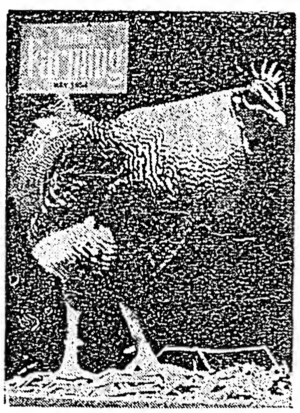
She will also have to remember that parboiled rice is more nutritious than raw milled rice. When rice is milled, it loses much of the proteins, mineral salts and vitamins, because, the 'germ' and the outer coat of the grain, which contain these, are removed in milling. In the steaming done in parboiled rice, some of the nutritive substances contained in the outer portions of rice get fused in the grain.

Under-milled rice again is more nutritious than milled rice. The ancient practice of hand-pounding of rice results in the retention of some of the nutrient substances, and hence hand-pounded rice is better than milled rice.

To get the best out of rice, therefore, let the housewife

- prefer hand-pounded or undermilled rice to milled rice
- prefer parboiled rice to raw rice
- reduce the number of washings of rice before cooking
- use less water for cooking rice
- not throw away the cooking water, but use it for other preparations, such as the pulse gruel.

THIS MONTH'S COVER



A Barred Plymouth Rock bird that got much praise at the recent Poultry Show held on the Cattle Show grounds at Bahadurgarh

BHATA SOIL need not be unproductive

MIXED FARMING PRACTICES AND PROPER GRAZING CAN MAKE EVEN POOR LATERITE SOILS PRODUCTIVE

THERE is new hope for the farmer who owns the laterite soil (*Chandal Bhata*) in Chhatisgarh in Madhya Pradesh.

The soil is proverbially infertile, and a poor crop of early varieties of grass, which withers away within a week of the cessation of the monsoon is a common sight on the soil, and occasionally, where the soil is a little better, the farmer raises some of the lesser millets.

Now, a system of mixed farming, tried at the Chandkhuri Farm under the State Government Dairy and Mixed Farming Scheme, is showing the possibilities of raising the fertility status of the soil to get better returns from the land.

Mixed farming helps to increase the humus content of the soil, with which it becomes highly responsive to irrigation. On the Farm, where the paddy yields have averaged 1,800 lb. an acre, last year, the yield rose up to 2,275 lb. an acre. The rise was due to the soil becoming more fertile as a result of the mixed farming followed.

LEY FARMING

Another method tried at the Farm for making the land more fertile was ley farming. According to this system, grasses are raised and the area closed for grazing for two or three years, following which the area is allowed to be grazed for a year, and then brought under grain or some other crop for the subsequent two or three years.

The 'Haveli' system also showed good results in improving the laterite soil. The entire run-off of the cultivated fields is caught and cattle allowed to wallow in it for two or three years. Thereafter the land is drained off and put under nutritious and high-yielding varieties of grasses as a cover crop for a few years.

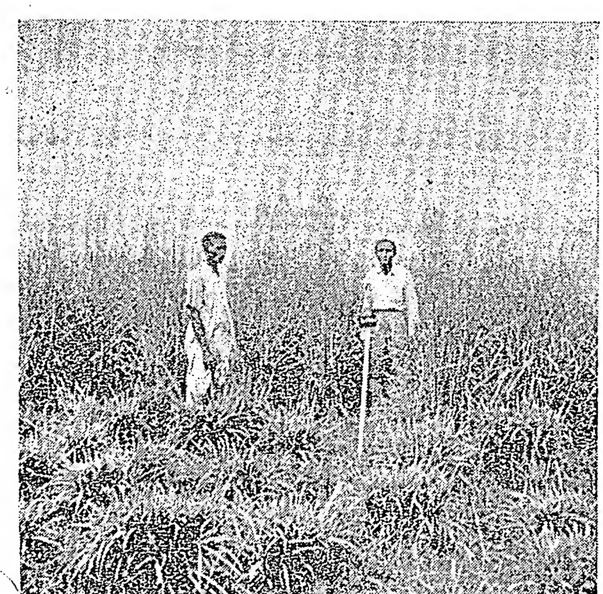
PLANNED GRAZING

Planned grazing, as a part of grassland management is paying dividends. The grazing technique is to divide the grassland into blocks, and allowing cows to graze for the first four days in each block. Cows are fastidious about coarse grasses, which the buffaloes readily consume. Hence buffaloes follow cows for the next three days, and sheep follow next, browsing closely and thereby checking weed-growth in the block. This technique ensures full utilization of all varieties of herbage in the pasture. After each rotation, the pasture land is harrowed with a chain or spike harrow to spread cattle droppings.

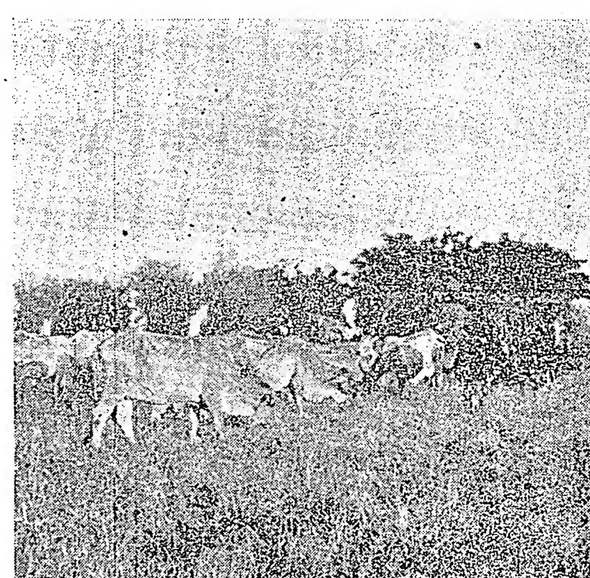
Grass is mowed in the close reserve. Attempts are being made to have two harvests : one for ensilage, and the other for hay or for grazing. The grassland of 170 acres on the Farm this year hasproduced enough to maintain 150 adult cattle for eight months in the year. Steps taken to increase the fertility of the soil, the grazing technique and other cultural operations followed helped in reaching this high standard.

Heifers of the Sahiwal breed maintained on laterite soils of this Farm are calving down at the

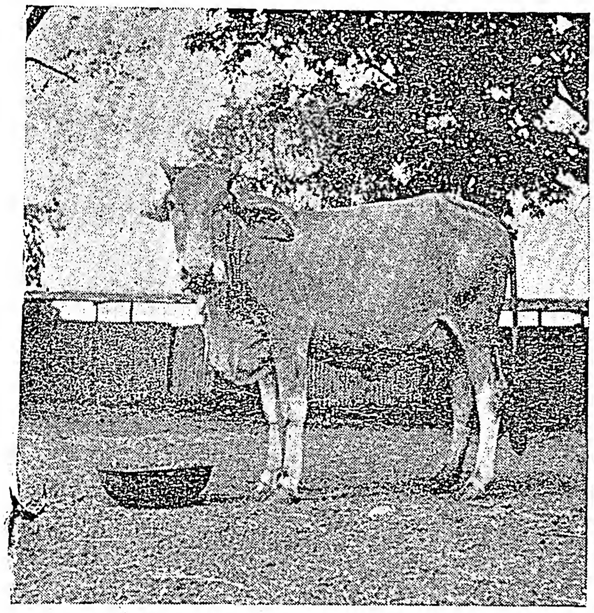
A fodder grass grown alongside a food crop



Cows grazing on the grass lands; buffaloes follow them next



Sheep follow the buffaloes; planned grazing is paying well at Chandkhuri



A Farm-bred Heifer; heifers on the farm calve earlier

average of $3\frac{1}{2}$ years and yield over 3,000 lb. of milk in the very first lactation.

The *Bhata* soil need not be dreadful any longer to the farmer if he follows the system of mixed farming, as demonstrated at Chandkhuri.

GOATS NEED GOOD FEEDING

Feed precautions to get better value from goats

By H. K. LALL

CERTAIN precautions taken in the feeding of goats can make them profitable animals to keep, whether maintained in ones or twos or in flocks.

In our rural areas, goats are maintained on grazing and browsing alone, occasionally the milk goats getting some concentrates. In the cities, they are mostly stall-fed, but are also sent out for picking what they can from loppings of trees and bushes. Then there is the poor individual who maintains a goat or two for milk. He tethers his animals outside his house, and seldom sends them out for grazing.

Goats do like browsing on small bushes and loppings of trees. But a reckless lopping of trees seen largely in villages will have a dangerous result. Much of the tree wealth is thus being destroyed, rendering many a fertile land into a barren waste. A judicious lopping or browsing of trees should be done if the life of the trees is not be jeopardised. Goat-keepers will do well to remember that by reckless lopping of trees they are hitting at their own existence.

When only a goat or two is maintained, it is best to tether it on a grassy plot where available. This can be done by means of a light chain or rope attached to an iron *khonti* driven into the ground. This tether must allow sufficient movement, say, for about 20 yards all round. The *khonti* can be moved to a fresh spot as and when necessary.

SUCCULENT FOOD

It is always advisable to furnish green grass or green leaves to goats every day as such succulent food helps them keep healthy as well as increase their milk-production. Leaves or grass in a wet condition, however, should not be fed fresh, but first dried and fed. Likewise, in the early monsoon, when the new grass is fresh and tender, it is dangerous to allow goats to eat very much of it at any one time. Such grass should be fed to them sparingly.

Where stall-feeding is practised good care should go to see that the food given is fresh and clean, without any signs of fermentation. The pails and other receptacles should be clean, and all left-overs should be removed before fresh food is filled in them.

AVOIDING WASTE

The goat should not be given any food that it cannot consume readily at any time. Any excess feed will be wasted. Hay should be fed sparingly, as any excessive quantity fed will be wasted as litter. Feeding at regular intervals will not only keep the appetite of the goat more even but will also make it relish the food better.

The feed given to the goat should contain sufficient material needed for its bodily functions, for growing (in the case of young animals), for the growth of the young in pregnant animals and for the production of milk in milch animals and 'condition' in meat animals.

Concentrated feeds should be given to the goats to supplement the grass or leaves they feed on. Goat-keepers are familiar with concentrates like gram and its by-products, wheat bran or husk and gram kernels which are used for feeding goats in milk. Sometimes pods of *babul* or *pala* (*jhar beri*) are used as a substitute for concentrates.

FOR MILCH GOATS

To obtain a maximum milk-

yield from goats, concentrates have to be fed to them. A milch goat requires a ½ lb. ration for its body needs (maintenance) and 5 oz. of concentrates mixture for each pound of milk yielded.

During lactation, the goat as a general rule should get 4 lb. of roughage (fodder) and 1 lb. to 1¼ lb. of concentrates per day. Though it is not customary to feed the goat during the dry period, it is advisable that it is given ½ lb. of concentrates along with the roughage every day. The quantity, however, will have to vary with the size of the breed maintained.

PREPARING CONCENTRATES

Locally available materials are best used for preparing the concentrate mixture. It will be cheaper too. The mixture should be balanced by using different feeds such as wheat bran, cake, gram or pulse *chunies*, maize, etc. While it is true that the goat gets tired of a monotonous diet, sudden changes in the diet are never advisable, as they upset the digestive system of the animal. Changes in the diet should be brought about gradually.

When the goat is going up in milk, she should be given feed a little in excess of her needs so as to encourage her to do her best. When there is no more rise in milk production to compensate for the higher level of feeding, it can be assumed that she has reached her maximum capacity and further increases in feed stopped.

The male should get the same feed level as the female, but if it were to be fattened for meat, giving a little more feed will be worth the while. For the buck, the feeding schedule should be the same as for adult-milkers.

FEEDING THE KID

Kids may be natural-reared or hand-reared. Natural-rearing, consisting of the kid being put on the teats of the mother is common in our country, hand-rearing being resorted to only when the mother dies or when weaning is desired.

Hand-rearing or feeding the kid with bottle and teat or from a pail can be done easily. Bottle-feeding, however, is better because this way the kid takes in a little of its saliva with the milk which helps in digestion. Kids also get accustomed to foster mothers. It will only be necessary to guide them to the teats.

Kids usually start nibbling at two weeks, and should be given concentrates when three weeks old. The quantity can be about 1/8 lb. according to season and availability.

SALT LICKS

Providing salt and other licks is as important for goats as for other livestock. Salt-licks should be, therefore, available to goats at all times. Stall-fed animals can also be provided with small quantities of salt mixed with their daily grain feed to the extent of one per cent.

Minerals are required for body-building processes as well as for the production of milk. The most important minerals required are calcium and phosphorus. These minerals can be supplied to the goats by feeding them with a little bonemeal.

ALL-INDIA

Eight common breeds of poultry comprising more than 400 standard-bred fowls from all over the country and belonging to nearly 40 breeders representing both Government and private farms were exhibited at the All-India Poultry Show held recently at Bahadurgarh on the All-India Cattle Show Grounds.

Besides White Leghorns, the breeds represented were Rhode Island Red, Black Minorca, Light Sussex, New Hampshire, Plymouth Rock, the improved Desis from the Central Veterinary Research Institute, Izatnagar, and fighting Aseles from Hyderabad.

A prize-winning Desi cock from Ajmer

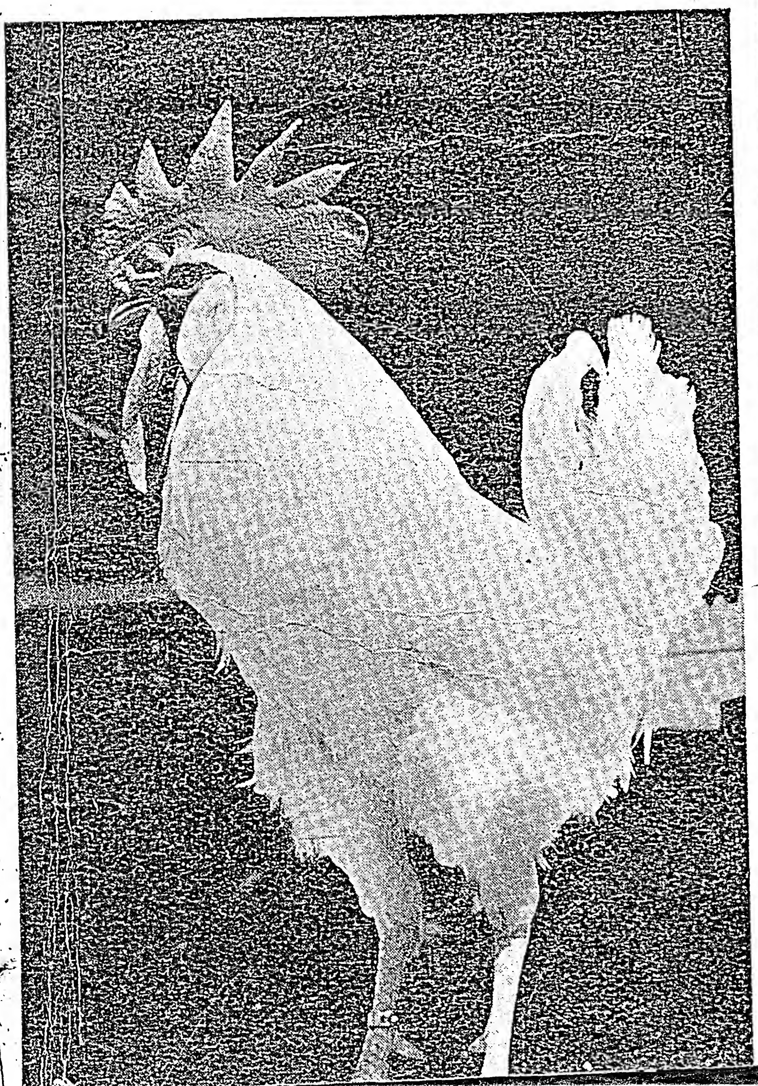
POULTRY SHOW

For over 100 birds attractive cups, certificates and cash prizes were awarded.

A White Leghorn cockerel of the Friends Poultry Farm, Saharanpur, U. P., and a White Leghorn pullet of the American Presybiterian Mission Poultry Farm at Etah were adjudged the best birds at the Show.

The Show afforded an excellent opportunity to breeders and fanciers to discuss the problems of production of high class birds and eggs and also to the layman to learn a lot about poultry-keeping on better lines.

A prize-winning White Leghorn at the Bahadurgarh Show



Contd. from page 17

The Supreme Champion Murrah buffalo bull jet black in colour, was typical of the breed, and possessed a massive frame and tightly curved horns. The bull was roughly $4\frac{1}{2}$ years of age.

Shri Hardwari Lal, the representative of the Gobhana Panchayat told me that besides gram and cotton seed, the buffalo bull was fed with 5 seers 7 oz. milk and half-seer jaggery.

Highestm ilk-yielder : 'Meena', a Sahiwal cow from the Military Farm, Meerut Cantonment, 10 years old and giving an average daily yield of 39 lb. 11 oz., annexed the Z. R. Kothavalla Cup awarded to the highest milk-yielding animal in the Show. The cow also won the Sir Datar Singh Challenge Cup.

The Sir Hurmasji Kavasji Dinshaw Cup for the highest milk-yielding buffalo cow went to a Murrah from Ferozepur Cantonment.

Best cow : 'Lafili', a Tharparkar cow six years and four months of age, from the Cattle-cum-Dairy Farm, Karnal, and 'Hemavati', nine years of age from Bhagawat Bhakti Ashram, Rewari were the recipients of the prize for the best cow in the Show. 'Hemavati' also won several cups and cash prizes aggregating to Rs. 1,025/-.

Best buffalo : The buffalo cow belonging to Shri Hoshiar Singh, village Nagloi, Delhi State, annexed the Baroda Challenge Cup awarded to the best buffalo cow in the Show, also received the Sir Sobha Singh Cup and cash prizes amounting to Rs 325.

Best Bullocks ; A pair of bullocks belonging to Shri Rachpal of District Rohtak stood first in the pulling contest and won the cash prize of Rs. 200.

Other prize-winners: The Bombay Humanitarian League Gosamvardhana Medals awarded to best cattle reared in *goshalas* or *pinjrapoles* went to a Hissar bull (Goshala Society, Kanpur), 'Rajkumar', a Gir bull (Panchawati Pinjarapole, Nasik) and 'Hemavati', a Hissar cow (Bhagawat Bhakti Ashram Rewari). They also received cash prizes of Rs. 100 each.

SHEEP AND GOATS

The number of sheep and goats in the Show was small but practically all the important breeds were represented. The sheep exhibited included the Bikaneri, Chokla and Gaddi breeds. The goats belonged to the Betal, Barbari, Gaddi and Jamnapari breeds The long, tall and robust Jamnapari buck 'Bhura' belonging to Shri Dagru of Etawah was the centre of attraction in this Section.

The sheep and goats were adjudged according to the different classes laid down on the basis of breeds, age and sex groups The winners in the different classes were awarded cash prizes.

Your Questions

★ MANURING SCHEDULE FOR ONIONS

★ DISEASES OF CHILLIES

★ TREATMENT FOR H. S. IN CATTLE

MANURING OF ONIONS

Q: Can you tell me in detail how the onion crop has to be manured ?

A: Onions normally require very heavy manuring both in the nursery and in the field where the crop is transplanted. Seeds of onion are sown in the nursery in the month of October. The beds are prepared well in advance. A bed of the size of 5 marlas or 1/32 of an acre will give sufficient seedlings for transplanting an acre of land. Flat beds are prepared and in the beds a cartload of farmyard manure, equal to about 25 maunds in weight, is applied. This is thoroughly worked in by ploughing or with the spade to a depth of 6″ to 8″. When the mixing has been done, the plot is irrigated so that the farmyard manure decomposes before the seed is sown.

Just before seeding the bed, mix $1\frac{1}{4}$ md. of wood ashes together with 15 seers of sulphate of potash. The bed is ready for sowing. After sowing, the beds are to be irrigated.

When seedlings are about six weeks old, another dose of a mixture of $1\frac{1}{4}$ md. of wood ashes and 15 seers of sulphate of potash is top-dressed in the bed. Usually, with such a manure application, the seedlings are vigorous. In case seedlings show a pale green colour, application of a mixture of 5 lb. each of ammonium sulphate and superphosphate should be top-dressed before irrigation. The seedlings are normally ready in 10 weeks for transplanting.

The seedlings are transplanted during December and January. The seed-bed required for onions should be mellow, deep and contain lot of organic matter. The three alternative methods of supplying the organic matter and the requisite quantity of nutrients may be listed in order of their merit as under:-

(1) When farmyard manure is available in plenty, 25 tons are applied to an acre. Along with the farmyard manure $2\frac{1}{2}$ md. superphosphate and 5 cartloads of wood ashes are also worked in into the soil. If sufficient quantities of wood ashes are not available, then $2\frac{1}{2}$ md. of sulphate of potash may be applied. This has a very good effect on the development of the size of bulbs.

(2) When, however, farmyard manure is not available, a green manure crop such as sanhemp is sown with the start of rains. The seed rate per acre used is one maund At the time of sowing sanhemp, an application of $1\frac{1}{4}$ md. of superphosphate helps to increase the fertility of the land. The crop is buried after 8 weeks of growth. When the soil does not possess sufficient moisture, one or two irrigations after burying the green manure are given to quickly decomposei t.

(3) In the absence of farmyard manure and when it is not possible to green manure the field because of an already standing crop, fertilizers are applied after transplanting. The fertilizer mixture should consist of $1\frac{1}{4}$ md. of ammonium sulphate plus $1\frac{1}{2}$ md. of sulphate of potash. This schedule of manuring is no substitute for the former two alternatives because organic matter is definitely required for raising a good bulbous crop of onions. When the land is poor, another top-dressing with ammonium sulphate may be essential when the crop is about 2 months old. This dose may be about $1\frac{1}{2}$ md.

The onion crop is a heavy feeder of plant nutrients and requires heavy manuring both in the nursery and in the field stage. The development of the size depends entirely upon the manuring given to the crop. The factor of spacing of crop, however, should not be overlooked when onions are raised for market. The spacing between row to row should be 9″ and plant to plant 3″. With such heavy manuring, it is also desirable to keep the beds sufficiently wet by constant irrigation.

ABOUT CHILLIES

Q: Is there a virus-resistant variety of chilli, and if so, which ?

A: Yes, Nos. 46 and 390 are the varieties of chillies which are resistant to thrips—the insect vectors that spread virus diseases.

Q: Does the virus persist on the seed or in the ground ? If on the seed, is there any way of treating the seed ?

A: No. Although the virus are believed not to persist on seed, or in the soil, it is advisable to use the seed from healthy plants. Anyhow, once the infection takes place, it is not possible to treat it.

Q: Is it likely that this disease is aided by any mineral deficiency? If so, what? Ours is a red laterite soil.

A: It is a fact that a poor growth of plants renders them more susceptible to diseases. Chilli thrives on rich, well-manured soil and the mineral dificiency, if any, should be met by the addition of artificial fertilizers.

Q: For the control of thrips what is the chemical, the concentration and the frequency for spraying? I. C. I. says Benzadrine Hexachloride. You say nicotine.

A: The control of thrips with nicotine sulphate is described in the article (March 1954 issue of "Indian Farming"). Benzadrine Hexachloride may also prove

useful. Spraying should be undertaken as a regular routine job before the virus diseases spread and the intervals may be regulated in accordance with the insect activity. Moreover, the virus-infected plants should be uprooted, taking care that their foliage does not come in contact with the healthy plants, and even those who pull out these diseased plants should be careful not to touch the healthy plants.

Q. Where may I secure the seed of the improved types, N. P. 46 and 390 ? We run a demonstration farm of 20 acres, and are preparing to raise and distribute seed.

A. The seeds of types N. P. 46 and 390 can be had from the Director of the Indian Agricultural Research Institute, New Delhi, 12.

Q. Is 'small leaf' the same as leaf curl ? The leaves do not curl, but new tiny leaves grow from the stalk and eventually all the plant has small leaves.

A. Yes. The symptoms described in the query are caused by virus diseases.

CATTLE DISEASE

Q. Can you suggest some treatment for *Haemorrhagic septicaemia* in cattle ? Please also let me know the treatment locally done by village people.

A. Haemorrhagic septicaemia usually runs a very accute course and death occurs quickly, so that there is scarcely any opportunity for undertaking treatment. For this and other reasons, it is advisable to have the animals vaccinated against the disease just before the rainy season every year. Suitable vaccines are available and confer a fairly good immunity lasting for a few months.

In some cases, the course of the disease is less acute and permits of curative treatment being attempted. Of the various drugs which have from time to time been claimed to possess curative effects, the sulphonamides (sulphamezathine, sulphadiazine, etc.) and the antibiotics (penicillin, aureomycin, etc.) appear to have given the best results in recent years. Similar claims have also been made in respect of the anti-haemorrhagic septicaemia serum.

There is no satisfactory indigenous method of treament for the disease. Household remedies like peppers, ginger, *zeri*, *ghee*, opium, and wine have only a doubtful value and may even be harmful in some eases.

The important points to remember in the treatment of bacterial infections in general, and *haemorrhagic septicaemia* in particular, are that the treatment must be started as soon as the animal is found sick; the drug selected must be administered in full therapeutic doses, and the treatment must be continued for a couple of days or so even after the animal appears to have clinically recovered from the attack. The usual measures of segregation, nursing, and proper feeding of the affected animals, disinfection of the premises, and vaccination of the herd must, of course, be also adopted.

Indian Farming

VOL. IV JUNE 1954 No. 3

IN THIS ISSUE

Editor : M. G. KAMATH

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Rs. 9-0-0 for 12 issues Rs. 4-8-0 for 6 issues
Annas 12 per copy

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Printed at Swan Press of Lahore, Sadar Thana Road, Delhi-6

EDITOR'S PAGE

THE NEW CAMPAIGN

Nation-wide interest in systematic and planned action on a broad basis designed to increase crop production was demonstrated in an emphatic manner last month immediately following the announcement of the campaign for increasing yields of the current standing crop of sugarcane. Requests came from a number of states asking that they be also included in the plans for the Campaign.

The new Campaign has been launched to increase sugarcane yields in the states of Uttar Pradesh, Bihar and the Punjab, where in spite of a large acreage under the sugarcane crop yields have not shown any appreciable rise for some years. The campaign has just one slant during the current year and that is the application of fertilizers in sufficient quantities to the standing crop. The response to this has been very encouraging. However, the greater test of the sugarcane industry's willingness to invest in higher yields will come next year when the sugarcane campaign on an all-India basis will be launched.

Unlike this year, the next year's campaign will cover all the important practices designed to improve sugarcane yields. Again, stress will be laid on intensified cultivation and not on extension of the present areas under the crop, as the present need in India is to economically increase the output on those acres on which usually the crops are planted.

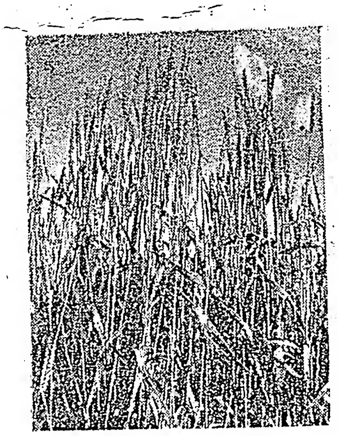
An heartening sign is the amazing speed with which farmers, who were formerly considered conservative, are changing their practices and adopting the new or improved methods recommended for increasing crop output. There are a number of reasons for the farmers' acceptance of such recommendations. The major one, it looks evident, is the confidence in the farmers' mind that these new practices will definitely increase their returns. Those in charge of the campaigns are making such recommendations to farmers as are proven, taking precautions to see that each step or each item recommended is an accurate reflection of practical tests and research.

With the launching of campaigns such as these, farmers are being shown new techniques for use in crop production so that not only the country will have more food and more raw material for her industries, but also that farm economy may improve. In the case of sugarcane, though considerable strides have been made in the field of research, it is seen that yields are still not what they can be. It has been found that several factors are responsible for keeping the output at low level. Of these, lack of irrigation facilities is a major one, and inadequate supplies of manures and fertilizers is another.

When the irrigation projects on hand, however, are completed, the situation so far as irrigation is concerned will no doubt improve. Yet, in the meantime, farmers can and should take recourse to application of fertilizers to the half-starved soils and thereby reap the benefits of increased yields. The sugarcane crop, a heavy feeder, responds very well to nitrogenous fertilizers and hence the present Campaign is to draw the attention of the farmer to the necessity of this important aspect of cane cultivation and also to make the fertilizer available to him in sufficient quantities and at a convenient mode of payment. In the states concerned the plan is being worked according to schedule and there can be no doubt that with the farmers so responsive as they have been, the Campaign is bound to yield encouraging results.

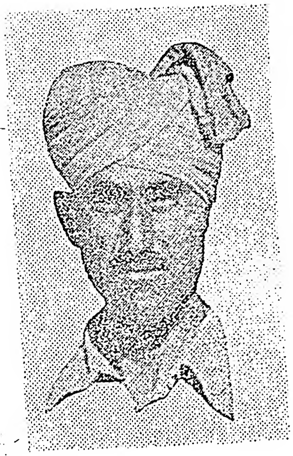
THIS MONTH'S COVER

How the wheat crop responds well to nitrogenous fertilizers was shown recently at the Agricultural Institute at Allahabad. The excellent crop seen in the picture got 40 lb. of extra nitrogen, for which it gave 37.5 maunds of grain. The manure, costing as much as 1.75 maunds of grain, gave an increase of 15.5 maunds in yields.



FARMERS I HAVE MET

THE MAN FROM GOBHANA



THE other day I met Shri Hardwari Lal, a farmer of village Gobhana in Rohtak district of the Punjab. He had a very interesting tale to tell about the Murrah buffalo-bull that was declared Best Animal at the All-India Cattle Show recently held at Bahadurgarh.

The interesting part of the story is that Shri Hardwari gave away a buffalo as a present to his daughter at the time of her wedding. Some time later, when he visited his daughter, he was very much impressed by the sturdy appearance of the bull-calf born to it. He wanted to take this bull-calf to his village and rear it into a first-rate animal for use in improving the village stock. But the high cost involved in maintaining the bull-calf had to be considered.

On his return to the village, he placed his proposal before the village panchayat who readily gave their approval to this project as the village was badly in need of a good bull. The panchayat agreed to bear all the expenditure in this connection and a retired army man offered to house the bull in his own *haveli* as well as look after it.

The animal was fed on 5 seers of gram, 5 seers of milk, 2 seers of cotton-seed (in winter) and ¼ seer of *gur* (in winter). Expenditure on all items except milk was met from the common funds at the disposal of the panchayat, and the daily needs of milk were collected from the villagers.

On an average, the bull is giving 500 to 600 services a year. There is no profit motive, as the bull is not hired to outsiders; it is only meant for use in the village.

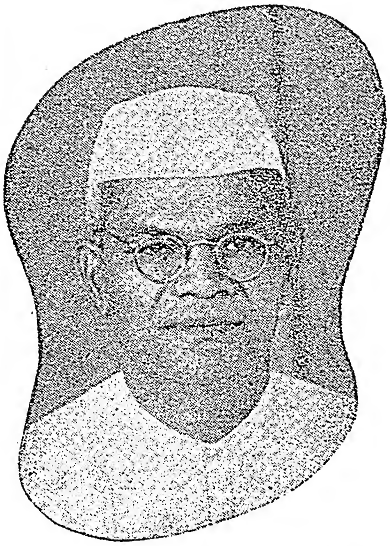
How leadership can prompt community action for the betterment of the villages has been shown by Hardwari, the farmer of Gobhana.

—H. K. S.

MEN OF THE MONTH

3 DAIRYMEN

WHO BANKED ON HARD WORK AND PATIENCE



K. G. PATEL

P. V. MEHTA

B. J. PATEL

By

HARKIRAT SINGH

"PROGRESSIVE, painstaking and prosperous", that is how I would describe Messrs. Keshavbhai G. Patel, Prabhubhai V. Mehta and Bhailalbhai J. Patel, owners of "Adarsh Dugdhalaya", a private dairy farm near Marve Road at Malad, a Bombay suburb.

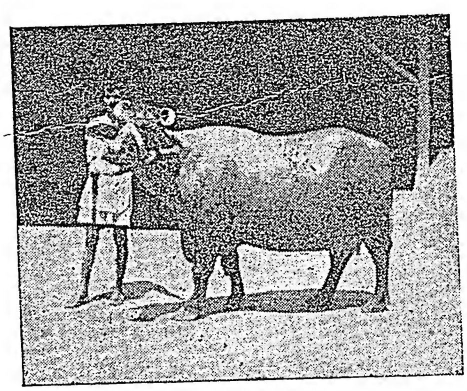
I visited this much-talked of dairy farm in April last. As I went round the Dairy, accompanied by my hosts, the vastness of the organization and the manner in which it was being handled impressed me, especially when I was told that all this had been done without much technical guidance from outside.

The very first question that I put to Mr. Mehta, who did most of the talking to me thereafter, was as to how they had rambled into this hazardous business and made a success of it.

"The plan for starting a dairy farm", came the reply, "was worked out by us in jail in the days of the Civil Disobedience Movement of 1932". My curiosity increased.

"We were faced with the problem of doing something when we got out of the prison", Mr. Mehta went on. "The milk trade was selected because we

This is Nilima, the Murrah buffalo bred on the Farm. Her highest yield was 8,068 lb. in 421 days. She is averaging 19.2 lb. per day against the average of 14 lb. for the herd



The morning milk moves out: vans such as this transport pasteurised milk to the distribution centres

had had some experience in this line as we had run a dairy farm as active workers of Patidar and Bardoli Ashrams."

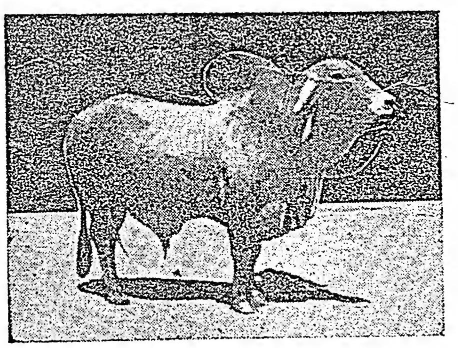
"According to the plan, on our release from jail in 1933, we borrowed a couple of thousand rupees from our friends and sympathisers and set up a small dairy farm, comprising only two buffaloes, and located it in a hired stable at Andheri." As I stretched by imagination a little in an effort to visualise the dairy in miniature of 20 years ago—producing 40 lb. of milk daily for its 20 customers — and compared it with the huge set up then before me —producing 7,200 lb. of milk a day and catering to the needs of over 2,000 patrons with a livestock population of 1,200 and a staff-strength of 500—I could easily realise how much hard work and patience had gone into the making of what "Adarsh" is today.

"The start was humble, no doubt", added Mr. Mehta, "but the ideal that we set before ourselves was lofty—that of supplying good and clean milk to the consumers." And a year's careful experimentation showed them that an honest living could be made out of this business with which malpractices are traditionally associated.

THE DAIRY COMES OF AGE

Encouraged by this, Mr. Mehta further told me, the present site was purchased and developed as a proper dairy ground at a considerable cost. Gradually, as the Dairy grew, necessary stables to house the

Hemraj, the Gir breeding bull maintained on the Farm. Breeding of stock receives careful attention from the owners



animals and residential quarters for the employees were put up, and a road linking the Dairy with Marve Road was constructed. By 1940, the Dairy was well-established with 280 animals.

One particular thing that struck me while going round the Dairy was the perfect cleanliness of the stables. "We wash them twice daily and also use phenyle and D. D. T. to do away with the germs that might do harm to our animals", explained Mr. Mehta.

The Dairy maintains mostly the Murrah breed of buffaloes and Gir cows. I came across some really fine specimens of these breeds. And it is all the more creditable that they were all raised on the Farm alone.

"Do you give your animals any special feeds, Mr. Mehta?" was my next query, "they are so healthy."

"Not only healthy, but they are good milkers also. We give them nutritious feeds, and in adequate quantities. In addition to cotton-seed, pulses like *arhar*, *guar* and gram, oilcakes like coconut, groundnut and linseed and wheat bran, they get sufficient quantities of hay, carrots, turnips, mangolds, lucerne, *jowar* and maize, according to the availability." I was told that the average daily milk yield per animal was 14 lb.

"Do you rear your own animals?" was my

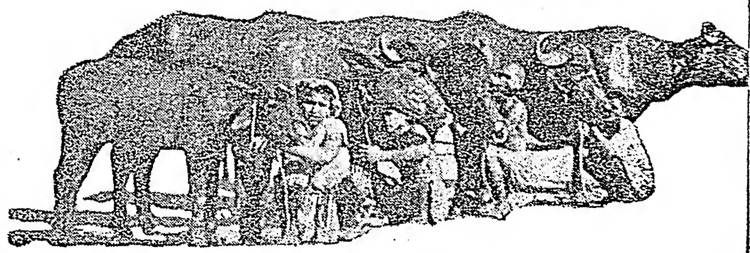
"Of course. The majority of animals that you have seen here are bred on the Farm. It is only rarely that we purchase animals from outside."

CARE IN SELECTION

"We, however, selected the best animals for rearing. Only male calves whose mothers yield more than 7,000 lb. of milk in one lactation are reared for breeding purposes. Similarly, only heifers whose mothers show a record of 5,000 lb. of milk in a lactation period are retained."

Mr. Mehta then told me that they maintained records of the daily milk-yield of individual animals of the herd.

Three Farm-bred generations. Their performance is watched, and undesirables are always weeded out



He also told me that as soon as any slackness in the milk-yield of any animal was noticed, it was immediately disposed of. The daughter's milk-yield was always compared with that of the mother to see whether there was any improvement in milk-yield in the younger generation.

Milking of the animals had been completed by the time I reached the Dairy as "this is done early in the morning," my host told me. He conducted me to the cooling chamber where all the milk had been collected for pasteurisation. "After pasteurising, the milk is filled in sterilised cans which are then sealed and sent to the various distribution depots set up in Bombay City and the suburbs," I was told.

Mr. Mehta was a little amused when I asked him as to how they were ensuring quality milk at the delivery end. The reply received was interesting.

A home-delivery system for supplying milk in sealed bottles was adopted in 1941, but after one or two years, bottles had to be discontinued due to their non-availability. It had to be replaced by some equally fool-proof method by which malpractices could not be practised by delivery-men. The method introduced, and which is still in force, is that each customer is supplied with a card on which he records daily his remarks about the quality of milk supplied to him. At the end of a month, these entries are gone through, and whereas bad remarks entail a cut in the wages of the delivery-men concerned, and even dismissal, a satisfactory report brings them an extra payment of Rs. 20.

SALVAGING DRY STOCK

I also came to know that keeping of dry animals is a special feature that distinguishes this Dairy from others. Mr. Mehta was specially emphatic in bringing this to my notice, as he said, producers of milk were generally not in favour of salvaging dry animals and bringing them back in milk. Such animals were usually sold to the butcher. "In this Dairy, dry animals are maintained with good care," he stressed "and at present, the 'Dugdhalaya' is maintaining about 250 dry animals. From our experience here, I can definitely say that dairy-farmers stand to benefit by salvaging their dry animals rather than disposing them of for a trifle".

The Dairy has 500 acres of land at Palghar, where the dry animals are kept and a sort of mixed farming is done with the stress on dairying. Of the 500 acres, 50 are exclusively devoted to the growing of fodder grasses. On another 400 acres good quality grasses are grown for hay purposes. These acres are being gradually improved by means of light cultivation and droppings of cattle which are allowed to graze on it after the grass has been cut. The Dairy is not only self-sufficient in regard to its fodder needs but also does a flourishing trade in this commodity. Availability of continuous supplies of fodder has

(*Continued on page 32*)

FARMING ELSEWHERE

AMMONIA AS FERTILIZER

Agricultural ammonia, cheapest source of nitrogen for application to crops, is becoming increasingly popular as a fertilizer on United States farms.

The nitrogen-rich ammonia is best suited for irrigated crops, because it can easily be used in irrigation water. However, it is also being piped with special equipment into the soil. Whatever the method of use, farmers consider it easier and more economical to apply ammonia than nitrates in solid form.

In California, agricultural ammonia was introduced on a limited scale in 1940. Today, the fertilizer is being used in large quantities in 40 out of the 48 states. At present, it helps the production of more than 200 crops including cotton, maize and citrus. This year's expected production is 3,00,000 tons.

The farmer simply allows the ammonia to flow into the ditches of his water system if he has an irrigated farm. Otherwise, he feeds into his land with an applicator which may be an instrument with 1, 2 or 4 wheels.

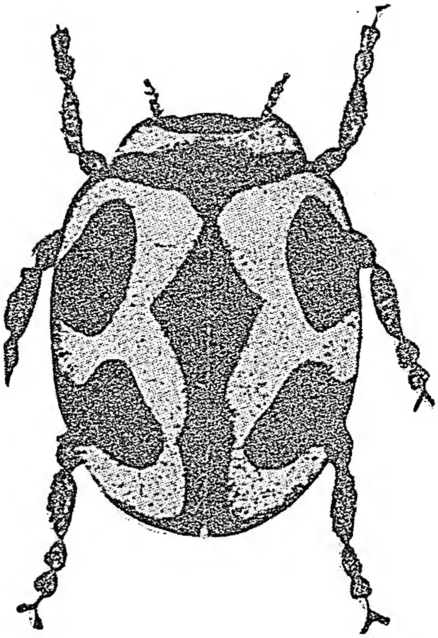
In most soils, ammonia has definite advantages over solid fertilizers. First, it is easier to transport and transfer from tank to tank. Second, ammonia goes quickly to work in the soil, while the solid fertilizer must be injected through rain or applied water. Although the liquid's actual cost per ton is higher than that of solid plant food, it is the cheapest source of nitrogen because the nitrogen content is 82 per cent by weight compared with 21 per cent in ammonium sulphate, 33 per cent in ammonium nitrate and 45 per cent in Urea.

Most farmers are of opinion that application of ammonia is labour-saving too.

COMPLETE CONTROL WITH

RODOLIA

STORY OF A SUCCESSFUL CAMPAIGN AGAINST A SERIOUS PEST IN MADRAS



Rodolia cardinalis

ONE of the most successful compaigns against insect pests in India ended recently. The campaign was against the Fluted Scale or the Cottony cushion scale (*Icerya purchasi* Mask).

The Fluted Scale is a serious pest of fruit trees in foreign countries and evidently was introduced into India. It was first noted on wattles (various species of Acacia) in the Nilgiris of Madras State in 1928 and further investigation revealed that it thrived on citrus varieties in addition to a wide variety of vegetation on the hills.

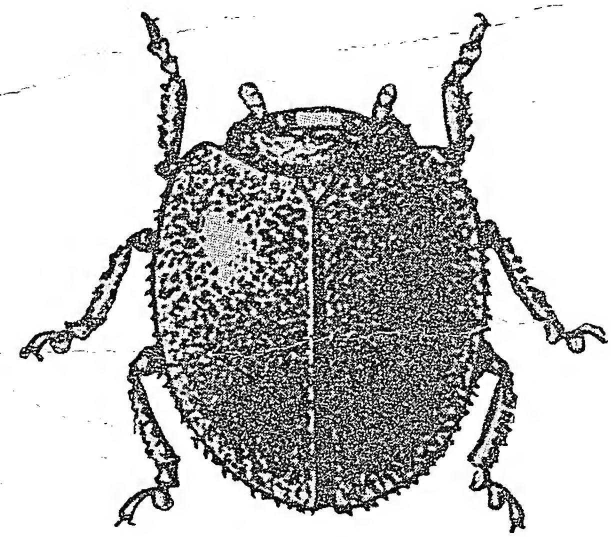
The scale is easily distinguished from its allies by its characteristic appearance and size. It is thick and somewhat elongated (quarter inch to half inch in length) with conspicuous longitudinal furrows on the surface. The insect is highly prolific and lives in colonies or masses on the different parts of the affected plants or trees. While the mealy wax on the grown-up scale is whitish, the eggs and young ones are brick-red or pinkish in colour.

After a short active period, the young ones settle themselves on suitable situations and grow in size actively sucking the sap of the host. A large population of scales living and multiplying on a plant is capable of inflicting severe injury to the host.

The length of a generation is about 2½ to 3 months in the hot season and about 2 months longer in the colder parts of the year. The insect gets spread in various localities mainly through human agency by the transport of infested material in trade and commerce.

In the earlier years when the pest made its appearance in the Nilgiris, the Madras Department of Agriculture took up emergency steps to minimise the pest attack and check its spread through mechanical methods of cutting and burning the infested material. Later on, investigations showed that the lady bird beetle (*Rodolia roscipennis* Muls), a caterpillar (*Stathmopoda melanochra* Meyr) and a fungus (*Cladospirium* sp.) were found to be the natural enemies of this pest. These were, however, found inefficient for the control of this new pest.

Rodolia roscipennis



In 1929 and 1930 a predatory beetle (*Rodolia cardinalis* Muls) was imported from California and Egypt and studied in detail to see the possibility of using it in the control of the pest. The experiment was attended with success and the predatory beetle was reared in different places and liberated in all the localities known to be infested.

The beetle Rodolia is small in size and dull reddish in colour. It is long-lived and lays large number of eggs. It breeds in captivity fairly easily if properly looked after and fed on scales.

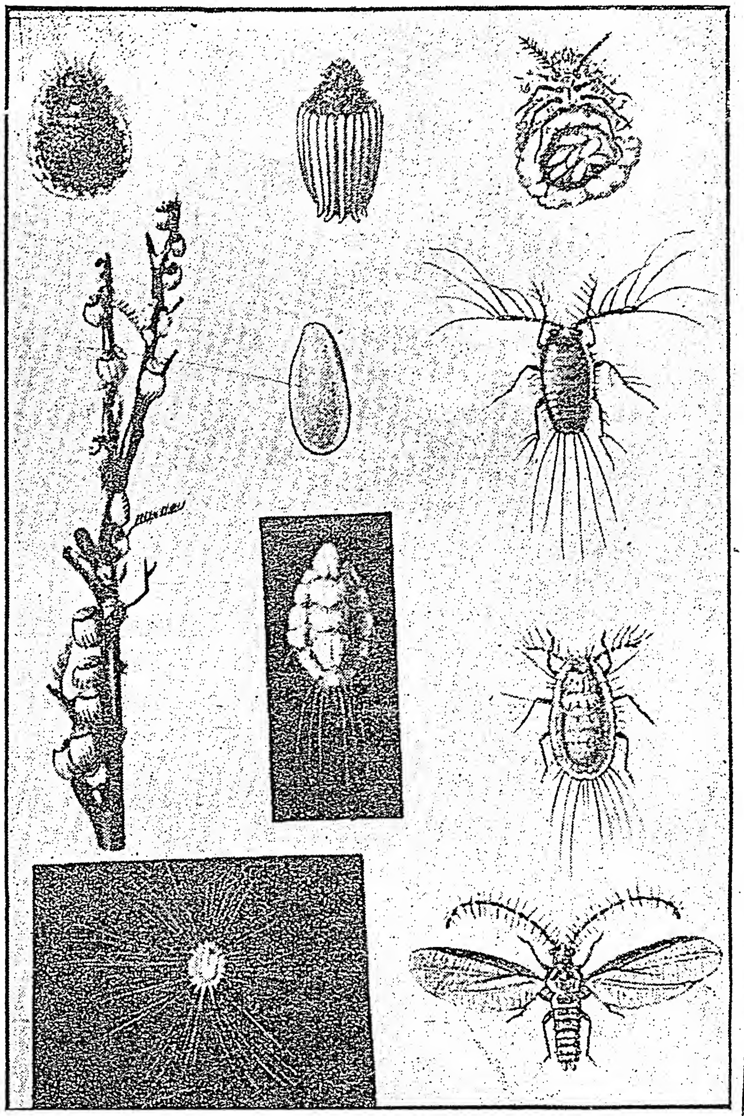
The work of breeding and releasing this beetle was so impressive and recoveries of beetles in the field so satisfactory that the biological station claimed unqualified success in having colonised the new-comer in all the infested areas. Field conditions showed a phenomenal decline of the pest and the survival to a remarkable degree of the new predator. Control operations were wound up in 1931.

The initial intensive work of rearing and liberation of the predatory beetle during 1929-31 kept down the Fluted Scale for over a decade. The predator which had established itself appeared at times of pest outbreak and the Nilgiris region became the reservoir from which specimens of this beetle could be collected for breeding and releasing in other regions.

SECOND INFESTATION

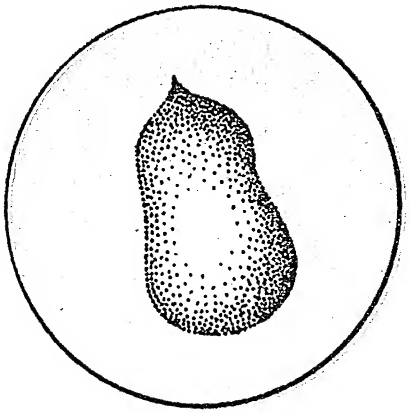
The year 1941 saw a secod wave of infestation by the Fluted Scale in the Nilgiris and Kodaikanal and the special laboratories in both these areas took up the work of rearing the predator in thousands. The Indian Council of Agricultural Research, realising the importance of the work, strengthened the Rodolia breeding Scheme and sanctioned research work for a period of two years from 1945 to 1947 in the first instance. Subsequently, this became a part of the All-India Co-ordinated Scheme for the control of the Fluted Scale and was extended year after year till 1952 when it was finally closed down.

During this period, thousands of Rodolia beetles were released in the Fluted Scale-infested areas of the Nilgiris and Kodaikanal on orange, wattle and gorse. Apart from the mass release of beetles, hundreds of them were sent to the Breeding Station at Bangalore.



Various stages in the life of the Fluted Scale

The Scheme, therefore, had complete success in colonising the predatory beetle and effectively checking the multiplication of the pest in different areas. Quarantine measures scrupulously applied to prevent transport of infested material further helped in quick control. The effective check on the pest protected valuable crops such as fruit trees, tea and coffee from getting infected. The Scheme also helped build up an excellent resource for the distribution of potential predators to other needy centres in India at times of emergency.



JAMAN SEED AS CATTLE FEED

One protein-rich food usually wasted is the seed of *Jaman*. Properly dried and fed, it can be a good cattle feed

INVESTIGATIONS at the Indian Veterinary Research Institute at Izatnagar have shown that the *jaman* seed can well be utilized as a cattle feed. The Animal Nutrition Division of the Institute has been searching for new animal feeds from hitherto untapped sources since 1940. A number of substances, which are usually wasted, have so far been found to be highly suitable as cattle feeds.

Though we have a high density of cattle population, their productivity is extremely low. Experience, however, shows that Indian cattle do possess high potentialities, and when proper care is taken to supply them with a balanced ration, their productivity is immensely increased.

The availability of digestible proteins, the flesh-forming material, is far short of the actual quantity required for feeding the animals, and increasing their productivity. Hence the Institute's search for easily available but so far untapped sources of protein-rich foods.

Jaman, (*Eugenia jambolana*), commonly found throughout India, is a tree usually of a considerable size with a thick and a rather crooked trunk. The fruit which is sour, acrid and sweet is eaten and the seed usually thrown away.

RICH IN PROTEIN

At the Institute, the seeds were analysed to find out their protein, carbohydrate and phosphorus contents. It was found that the seeds were fairly rich in protein. In protein-value and the concentration of carbohydrates (the energy-giving material), the seed is comparable with grains like barley, maize, oats, rice, wheat, etc. The content of calcium—the bone-forming element—in the seed is higher than in these and many other grains. It is, however, appreciably poor in phosphorus.

After collecting the seeds from underneath the trees or waste heaps, they should be washed first to remove the adhering sand and dried for about ten days in the sun. Drying in the sun enhances keeping quality and frees the seeds of the peculiar odour they possess.

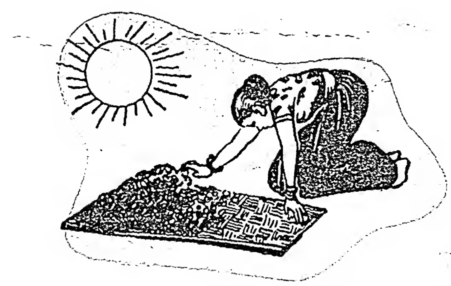
Animals are not ordinarily attracted towards these seeds, presumably on account of the peculiar odour they have. When, however, the seeds are washed free of sand and dried in the sun for a few days and then offered to them in combination with grains and/or oilcakes, they show no disinclination to eat them.

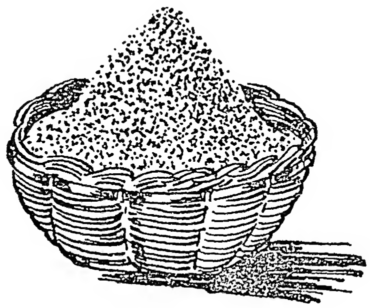
Feeding the seed to animals may be done in combination with grains or oilcakes in a small proportion. The animals soon acquire a taste for it, and the proportion may then be gradually raised to 15 to 20 per cent of the concentrate mixture. In this proportion in the concentrate mixture, *jaman* seed has been fed to cattle over prolonged periods with satisfactory results. The nutritive value of *jaman* seed compares favourably with concentrates of proved value.

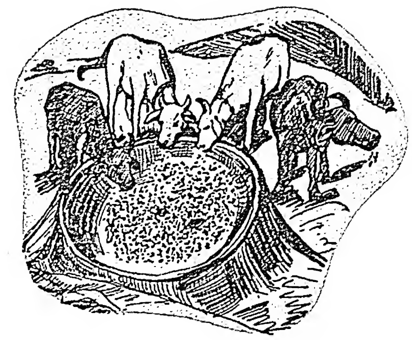
The keeping quality, like that of other seeds, seems to be satisfactory, as *jaman* seeds can be kept over fairly long periods without deterioration.

FIELD EXPERIMENT

In order to convince the rural population regarding the usefulness of *jaman* seed as a cattle feed, extension experiments were carried out in Delapir, a village about a mile from the Institution. A concentrate mixture containing grains and or oilcakes together with washed and dried seed was fed to growing calves work bullocks and also to milch animals, and the proportion of *jaman* seed in concentrate mixture was gradually raised to 20 per cent. The animals showed no disinclination to this







feed, and maintained good health. The results of these feeding trials have convinced the village stock-owners of the usefulness of *jaman* seed as a concentrate and all available *jaman* seeds are being utilized by them now for this purpose.

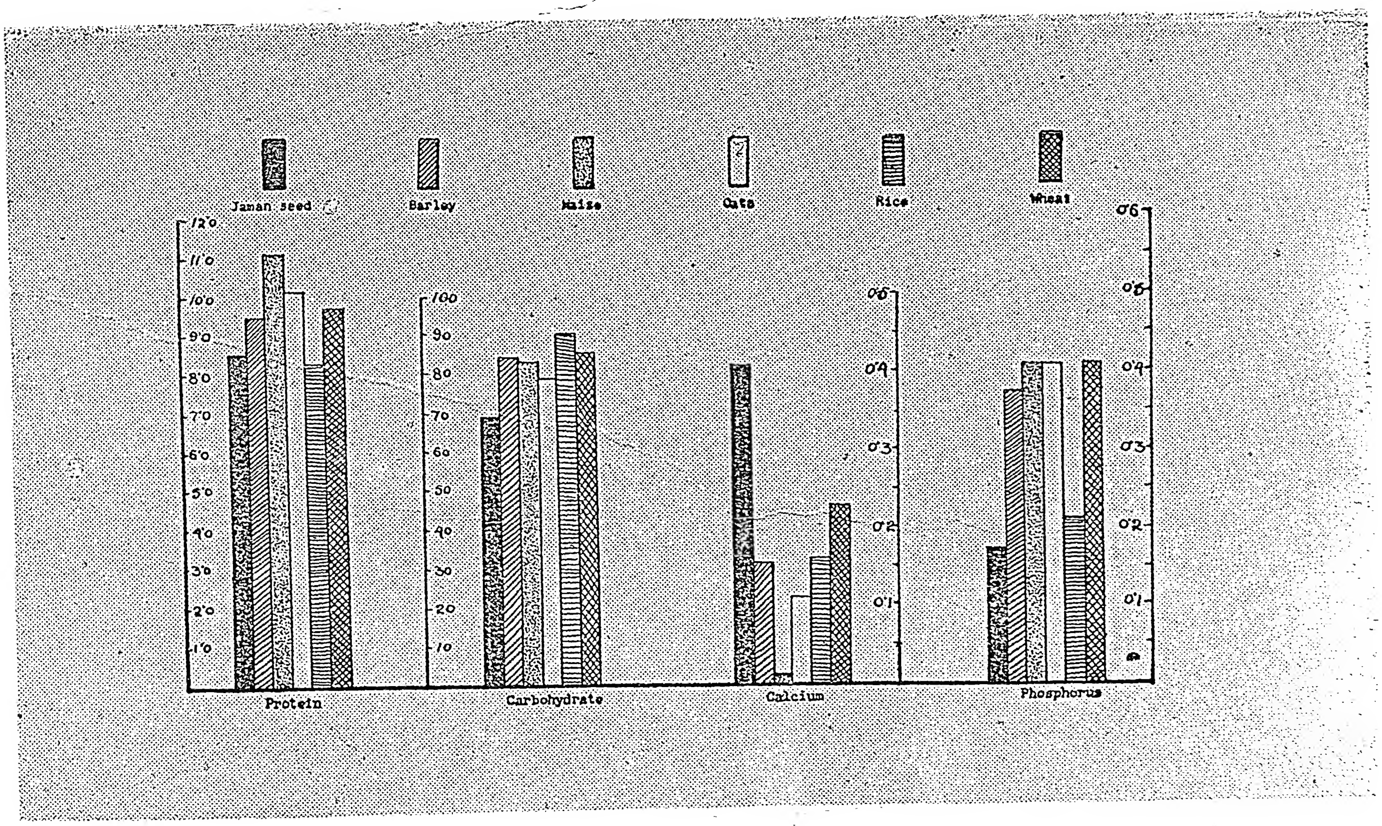
Two people working for eight hours a day can collect in season about thirty maunds of seeds yielding about seven maunds of dry material. Adding transport charges to that involved in the collection, washing and drying of seeds, the cost would work out to a rupee a maund. Since people can collect the seeds during their leisure hours, the cost involved will still be less.

Though an accurate assessment of the quantity of *jaman* seeds annually available in the country cannot be easily had, roughly it can be taken that one tree yields about two to four maunds of seeds.

These seeds, when properly collected and stored, would make available from a hitherto unutilized source millions of maunds of protein-rich food worth several crores of rupees annually for our livestock.

Farmers should make all efforts to utilize this hitherto untapped source of excellent cattle feed by collecting every seed in season and thereby improve the health, growth and milk-yield of their animals.

HOW "JAMAN" SEED COMPARES WITH THE COMMON GRAINS



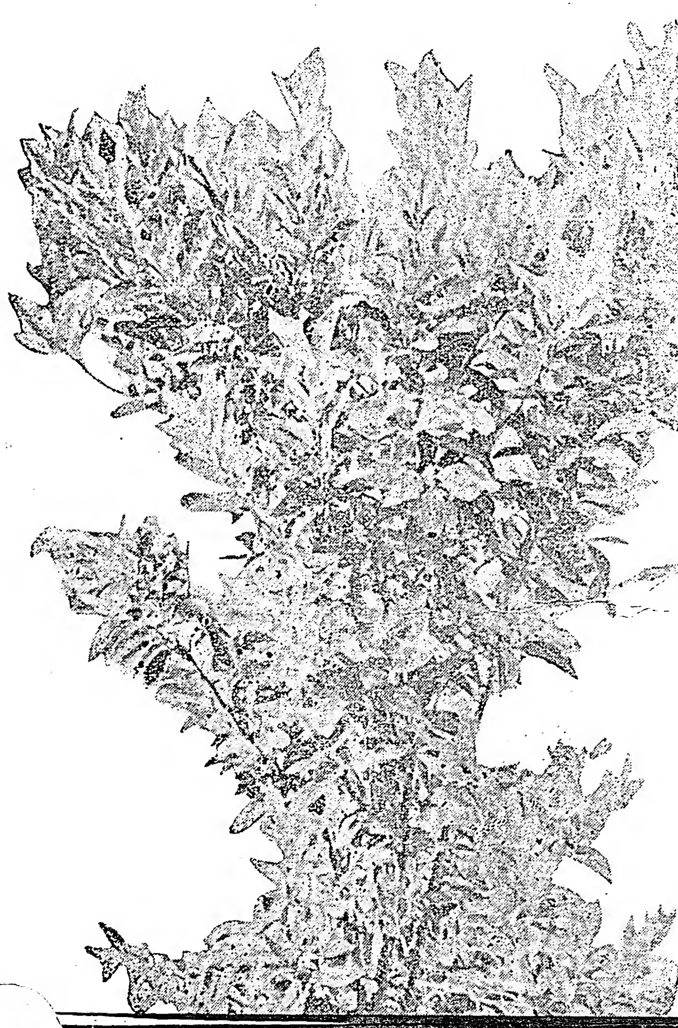
WHY MANDARIN ORCHARDS DETERIORATE

STUDY SHOWS LACK OF SOIL MOISTURE AND INADEQUATE MANURING AS MAIN CAUSES

IN resent years,a deterioration of Mandarin orange trees has been evident in several orchards in Wynaad (Malabar) and Coorg. The affected tree produces a heavy crop of undersized fruits which is followed by yellowing of the foliage, defoliation and dieback of the twigs. In the course of a couple of years the entire tree succumbs. The roots of the affected trees exhibit varying degrees of rotting.

Mandarin orange (*Citrus riticulata* Blanco) is cultivated over a large area in these tracts. The orchards are situated on slopes of hillocks or in valleys at elevations ranging from 1,000 to 3,000 feet above sea level. Only seedlings are planted and these grow under rain-fed conditions. The rainfall varies from 90 to 150 inches, but is restricted to the months of June to November except for some scattered showers during the rest of the year. A rather prolonged dry period prevails from December to May and usually there are no facilities for irrigation.

This three-year old tree was manured and the soil covered by mulch



In order to investigate the cause of this deterioration, the Madras Government launched a scheme with the aid of the Indian Council of Agricultural Research in 1949. Under this scheme a survey of over 100 orchards in different localities of Wynaad was made.

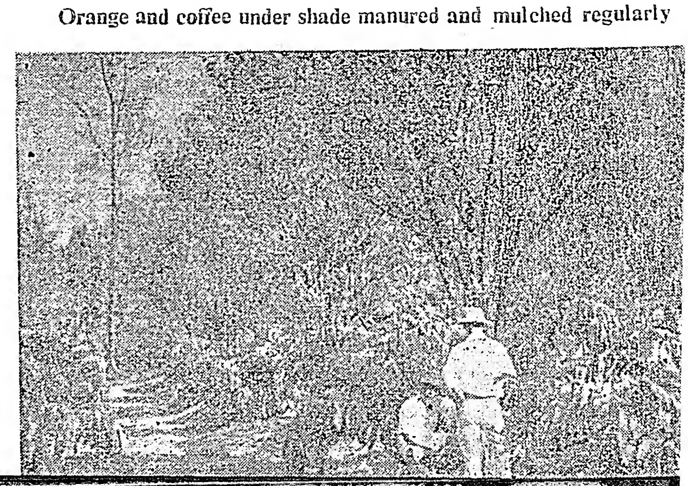
It was found that deterioration of trees was absent in young orchards. There were more casualties in trees growing over exposed situations liable to soil erosion, and where the soil was shallow or water-logged. A higher incidence was noticed in portions of orchards facing south and west. In the orchards where coffee was grown under shade along with Mandarin, such deterioration was very low.

FACTORS RESPONSIBLE

Investigations, however, revealed that this deterioration was not due to any one specific factor, but many, the most important being lack of soil moisture and inadequate nutrition.

Soil moisture plays a significant role in initiating deterioration. On account of drought conditions prevailing over a continuous period of 4 to 8 months,

Orange and coffee under shade manured and mulched regularly



the trees are adversely affected by lack of sufficient moisture in the soil. The increased incidence on exposed situations and on the tops of the hills indicates the importance of this factor. In Wynaad, the soil around the trunk of orange trees is given one or two diggings every year. This is a harmful practice. Considerable improvement in the appearance and growth of the trees can be effected by providing the soil round the trees with mulch covers of dry leaves during the dry season.

Lack of proper nutrition is a major factor contributing to deterioration. The foliage of the affected trees exhibits varying degrees of chlorosis. Analysis of leaves from healthy and affected trees from the Wynaad tract showed nutritional deficiencies in the latter.

In mountainous regions with heavy rainfall, leaching of nutrients from the soil is bound to occur. The orange trees absorb large quantities of nutrients from the soil each year for the production of new foliage and fruits. Unless these losses are made up by adequate manuring, the soil becomes depleted in course of time and trees lose condition. Deterioration is invariably noticed when the plants are in bearing.

The low incidence of deterioration in well-managed orchards and considerable improvement of the trees which had received systematic application of manures every year show the importance of manuring in the proper maintenance of these orchards.

Decided improvement in the condition of trees and fruit production can be effected by applying the following doses of manures per tree :

75 lb. farmyard manure, nitrogenous fertilizers (10 lb. of groundnut cake), 1 lb. superphosphate, 1½ lb. potash and 20 lb. wood ash. Lime has also been found to be useful when applied at the rate of 20 lb. per tree every alternate year.

These manures are best applied in two doses, in June and November.

Orange roots are very sensitive to wounding and wounded roots are readily infected by wound parasites present in the soil. Infection of orange roots by fungi like *Diplodia* is further aggravated by lack of adequate supplies of nitrogen, and lack or excess of moisture.

This three-year old tree received no manure, but the soil was mulched

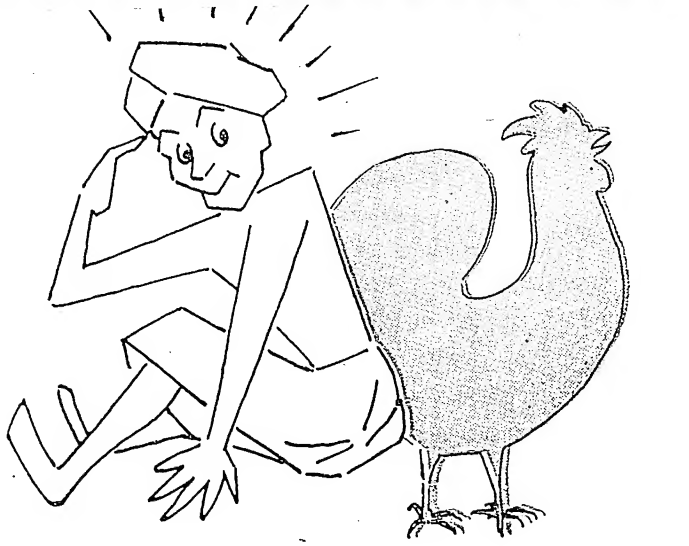
Since such aggravating circumstances are prevalent in the orchards of Wynaad, these may also be contributory factors to the incidence of root rot and consequent deterioration.

Besides these factors, high incidence of stem borers, successive infections by *Phytophthora palmivora*

(*Continued on page 15*)

Orange and coffee—no shade—no manure—no mulch; exposed soil and hence plants are dying

An orchard in an exposed situation. Note the trees are poorer in the upper portion



STARTING A POULTRY FARM ?

By
S. G. IYER
Indian Veterinary Research Institute, Izatnagar

A few things to think of before embarking on poultry-keeping

MORE and more people are getting interested in poultry-keeping, and want to start on this profit-getting vocation either as a side-line or as a main bread-earning business.

How do I start on a poultry-farm, is a question that most ask. Thought to a few things before one embarks on poultry-keeping saves a lot of heart-burning later, if things don't go as they should.

The first thing that should receive consideration from the future poultry farmer is the market. He should be assured that there are reasonable prospects of disposing of poultry produce at rates that cover up expenses and leave a good profit margin behind.

The market may be for table eggs and table poultry, or for hatching eggs and breeding stock.

Large markets for poultry-products are to be found mostly in large cities and towns, where a good number of well-to-do people reside. If you are living within a marketing distance of these places, you can build up your own private poultry products trade. Near the bigger centres, another profit-bringing side-line would be to raise fattened chickens weighing from 1 lb. to $1\frac{1}{2}$ lb. and sold at eight weeks. Turkeys too would provide another side-line here.

ASSURED MARKET

If you prefer selling hatching eggs and breeding stock, it is always better you start with in a district where there is already a demand for the same. In certain cases, it may even be paying to start in a district which is yet to be developed, as others will soon try to copy you, and will naturally purchase the foundation stock from you.

Much of the success in the marketing of the products, however, depends on the contacts you make, and the reputation you establish in supplying only the best to the customers or consumers.

Coming to other details, attention has to be paid to the type of soil on which the poultry farm has to be located. Extreme types of soils such as too dry and sandy or wet and stiff are not desirable for keeping poultry on.

Light soils, though they allow excess water to drain away easily, and are usually ideal for poultry, suffer from a serious drawback. They do not produce good grass, and birds do not thrive on them as one expects to. Very heavy soils too should be avoided as birds do not thrive well on such soils and stagnant water gives rise to diseases such as coccidiosis and worm infection.

I would prefer a medium soil with a fairly good drainage as such a soil will be healthy and the herbage too will be good.

To have a land for a poultry farm nearabout a city or an industrial area would be good no doubt, but remember, such a land would be very costly.

PROXIMITY TO ROADS

Proximity to good roads is desirable. A farm near a busy road and a good signboard help draw the attention of the public and build your retail trade bigger.

Proximity to jungles or waste lands has been responsible for losses of flocks due to wild animals, and hence this is not desirable.

Birds detest strong winds, and hence a sheltered locality should be preferred to barren and open locality. Large trees on the site, however, are not desirable, as they harbour birds like crows which may bring in poultry diseases.

An abundant supply of cheap labour is a strong point to be considered. Cheaply available labour brings poultry-keeping costs down. Efficiency, however, should not be sacrificed for the sake of cheap labour.

Food is the major item of expenditure, and it will pay to fix the farm in a locality where poultry foods are available at reasonably cheap rates. Protein foods are relatively more costly, and hence it would be good to select a spot where there is abundance of cheap proteins of good quality.

Freedom from diseases is a point deserving full attention. Certain districts seem to have a better poultry-health record than others. The farm should be well away from a poultry market and should not adjoin or be likely to adjoin another farm from which disease-infection can spread.

An abundant supply of good water is essential for the birds. It is better that the water is from a good well or a spring on the farm itself. Stagnant water or slow-running water coming *via* other farms should be looked upon with suspicion.

ONE OR TWO BREEDS

The next question to consider is what breed ? It is always better to start with one or two breeds than too many. Once you have established a name for these, then you can add more, may be, for odd sales.

To begin with, select the established breeds for which there is already a demand. Again, the choice of the breed will depend upon whether you intend keeping poultry for eggs, table birds or for stock purposes.

For commercial egg-production, crosses of White Leghorns and Rhode Island Reds would be highly desirable, as these are hardy and excellent layers, and fairly good table birds, are quick-growing and have good carcases. However, if there is good demand for hatching eggs and breeding stock, it may be paying to keep pure breeds.

In our country, there is a good demand for White Leghorns and Rhode Island Reds, though there is a limited demand for Black Minorcas, Australops and Light Sussex, and sometimes for other more fancy breeds. But you, a beginner, better stick to the utility breeds to start with and gradually build up a small stock of other breeds when you gain more experience and have established yourself.

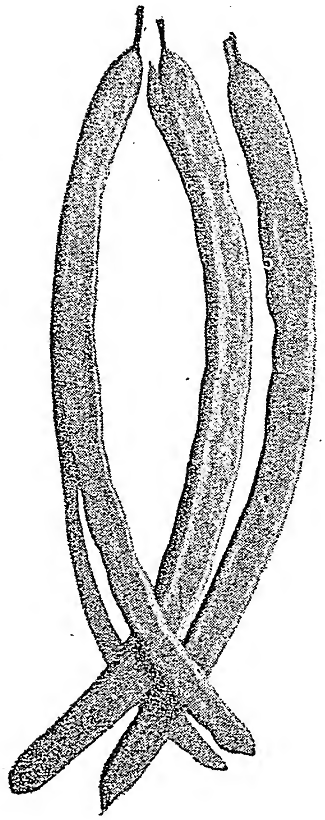
(*Continued from page 13*)

(causing leaf fall and fruit rot), *Oidium tingitaninum* (causing powdery mildew) and *Pellicularia salmonicolor* (causing pink disease) have been observed. Unless these are kept in check by the adoption of systematic plant protection methods, the health of the trees is bound to suffer culminating in death.

In brief, provision of mulch-covers over the soil, judicious planting of shade trees, adequate application of manures and timely protection of the plants against pests and diseases will result in the improvement of orchards.

MESQUITE FOR THE ARID GROUND

By
HARBHAJAN SINGH,
Indian Agricultural Research Institute, New Delhi



Ripe Mesquite pods

RECENTLY, press reports indicated that about 250 maunds of seed of the Mesquite tree (*vilayati khejra* or *vilayati babul* or *vilayati kikar* and botanically, *Prosopis juliflora* D. C.), *babul* and a few other trees were sown from the air in a belt 25 miles long and two miles broad in the Rajasthan desert.

This experiment was conducted with the objective of creating a 400-mile green belt in the Rajasthan desert, ultimately to help check the shifting of sand and thereby check any further extension of the desert.

The preference given to Mesquite over other trees which can also be grown in dry areas is of interest.

The Mesquite, an evergreen spiny tree, is a native of the arid regions of Mexico and Central America. The tree was introduced into India in 1877, when the first consignment of seeds was sent from Kew, England. It was successfully grown in Jodhpur (Rajasthan) as early as in 1915. Now it is found over a greater part of the plains in this country. It is also very common on the ridge at Delhi. Four forms of this tree are reported to occur in India. These are known as the Australian form, Mexican form, Argentine form and the Peruvian form.

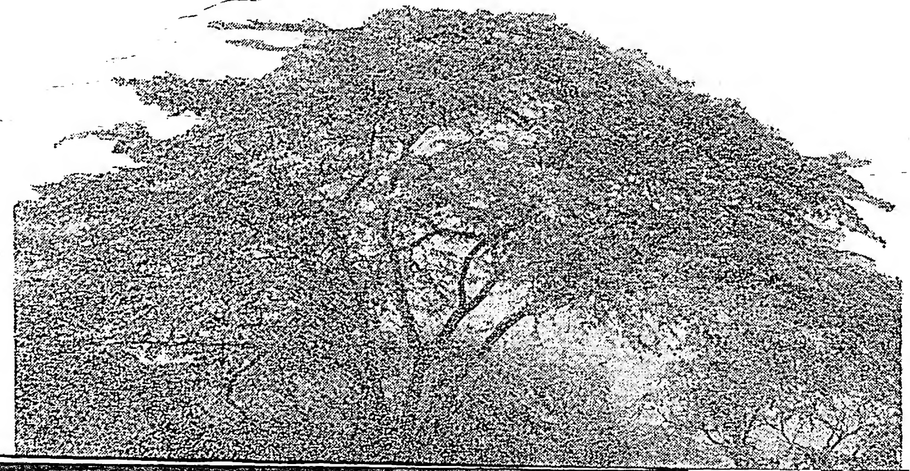
MULTI-PURPOSE PLANT

—The Mesquite is a multi-purpose plant. It is drought-resistant and can utilize arid, barren ground where very few other plants can grow. This ability of the Mesquite to grow satisfactorily in dry areas is attributed to its stout and tapering tap root which goes as deep as 70 feet into the soil. The tree attains a height of 30 to 40 feet and a spread of 20 to 25 feet. It is quick-growing, and usually flowers twice in the year, during March and September.

The long sugary pods, particularly of the Australian form, are a cheap source of digestible protein, and are relished by cattle. A 100 lb. of pods are reported to contain 8 lb. of digestible protein, 50 lb. of carbohydrates and 21 lb. of fat. The flowers, borne on long spikes, secrete honey, and as such are visited by honey bees. The Mesquite gum is almost identical with gum arabic. This tree is also a source of tannin. When planted closely, it forms a good perennial evergreen protective hedge. Animals, including goats, normally do not browse on the leaves of Mesquite. The wood is considered useful for posts in fencing.

The Mesquite when well-esta-

Mesquite thriving on the rocky ridge in Delhi

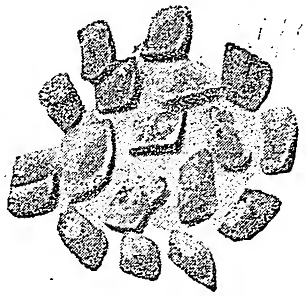


blished grows luxuriantly in very hot and dry situations. In fact, damp situations are unsuitable for it. With regard to the use of this introduced plant in forest afforestation, the most important factor worth considering is the nature of the seed and requirements for its satisfactory germination.

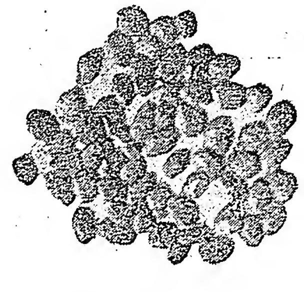
The seeds which have hard coats are individually encased in somewhat rectangular closed pocket-like structures formed out of the cartilaginous inner lining of the pod. These 'pockets' are embedded in the spongy pulp of the pod. Due to the cartilaginous nature of the 'pockets' and the sticky pulp, some effort is necessary to take out these 'pockets' from the pulp and the seeds from the 'pockets'. All these conditions are thus responsible for the slow and poor germination of the seeds under natural conditions, especially in areas of low rainfall such as the Rajasthan desert.

It has been reported that the germination of seeds recently sown in the Rajasthan desert ranged from 10 to 80 per cent in various situations, depending on the soil condition and moisture supply. Even after germination, there must be sufficient moisture for the young seedlings to establish themselves.

Grazing cattle, goats and sheep relish the sweet pods of Mesquite. The spongy sugary portion of the pods is digested, while the seeds,



Cartilaginous 'pockets' encasing the seeds



Seeds of Mesquite

which retain their viability, are passed out. These seeds germinate more rapidly when moistened by a shower of rain, thus helping natural regeneration.

In view of the difficulties experienced in seed germination and establishment of young plants in dry areas, the results of the air-sowing in Rajasthan may be watched with interest. General experience shows that direct sowings in drier areas are usually not satisfactory. However, the Mesquite if once established will solve the problem of desert afforestation.

RAISING MESQUITE

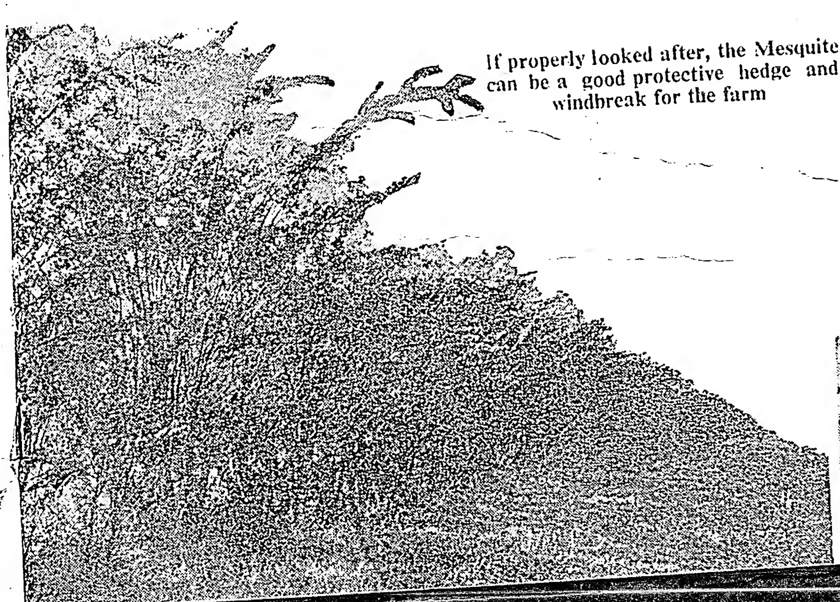
Farmers can use the Mesquite as a protective live fencing for their farms or for raising plantations in waste lands for fuel and for use as cattle feed. The following general hints will be found useful for the growing of this species.

Collect the pods in May-June or September-October and dry them thoroughly. Seeds collected during May-June can be sown immediately after collection and the seeds collected during September-October can be sown from the beginning of the following April.

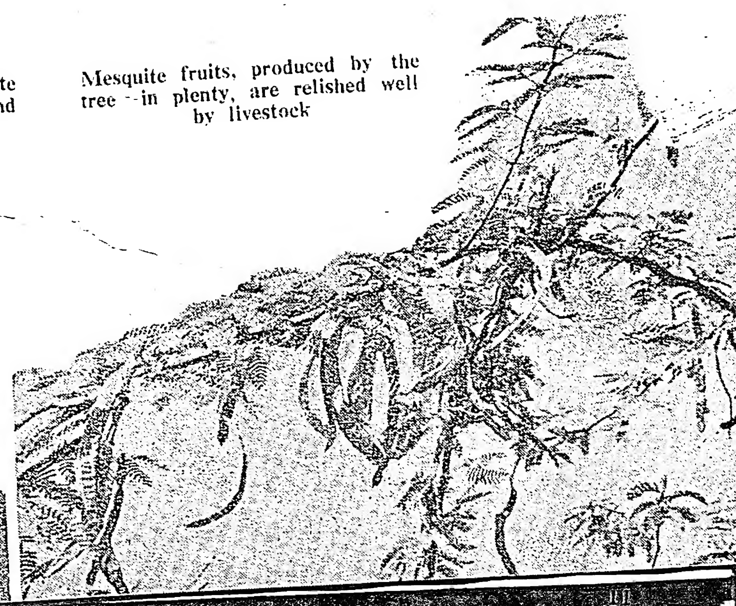
At the time of sowing, break the pods into pieces and soak in water for 24 to 48 hours. Isolate one-seeded 'pockets' by rubbing and separating the pulp. Sow the 'pockets' in flat nursery beds. Germination is usually slow and irregular. Frequent watering will be necessary.

Germination can be improved by treating the broken pods in sulphuric acid (1 part to 4 parts of water) for 24 to 48 hours to remove the pulp, etc., and then giving hot water treatment to the 'pockets' encasing the seeds (5 minutes at 70°C).

(*Continued on page 25*)



If properly looked after, the Mesquite can be a good protective hedge and windbreak for the farm



Mesquite fruits, produced by the tree in plenty, are relished well by livestock

SUGARCANE YIELDS NEED NOT BE LOW

By
R. D. BOSE,
Secretary,
Indian Central Sugarcane Committee

DURING the crop competitions for sugarcane conducted in Uttar Pradesh in 1950-51, a farmer in the Meerut Range produced an acre-yield of 1,803 maunds of sugarcane. In other cane competitions held in the State, farmers produced crops yielding 2,000 maunds per acre.

In Bihar, a local cane-grower secured 3,083 maunds of sugarcane per acre during 1951-52. Other cane-growers, with earnest efforts, have also been able to secure yields, surprisingly high for the State.

These high figures only show that given proper attention, a high tonnage of sugarcane can be realised even in Uttar Pradesh and Bihar where acre-yields have been ranging between 300 and 400 maunds per acre.

An analysis of how these farmers were able to produce many times the average acre-yield showed that they cultivated their fields in proper time with the country as well as soil-inversion ploughs, giving in all 14 such ploughings as preliminary cultivation. They planted the cane 3 ft. apart and used high-yielding cane varieties for planting. Heavy doses of farmyard manure or leaf compost and heavy doses of oilcakes and/or sulphate of ammonia were applied. They gave irrigation and inter-culture in time and paid proper attention to plant protection measures. Personal supervision of all agricultural operations also played an important part in getting them such high yields.

HELP FROM RESEARCH

In the field of sugarcane cultivation, the Indian farmer has, no doubt, made considerable improvement. Sugarcane research has helped him in no small measure to produce far better crops than what he used to do any time before. Yet, acre-yields of sugarcane are still far from satisfactory. In some areas, the yield position is very low and has not shown any tendency to rise and in some others shown a progressive decline.

The level of production in the North is between 300 to 400 maunds per acre, while in Peninsular India the average yields range from 900 to 1,000 maunds per acre. Even these yields are low when compared to the average acre-yield of about 1,700 maunds of Hawaii, 1,550 maunds of Java and 1,150 maunds of Peru.

The demand for sugar and *gur* in India is increasing day by day, necessitating the import of foreign sugar to supplement home production, and hence increasing our home production has become a matter of national importance.

Several factors contribute to improved cane production. Adequate irrigation facilities, use of disease-free and improved varieties of seed material, application of proper manures and fertilizers in the required quantities, use of better cultural and cropping methods and control of pests and diseases are some of them.

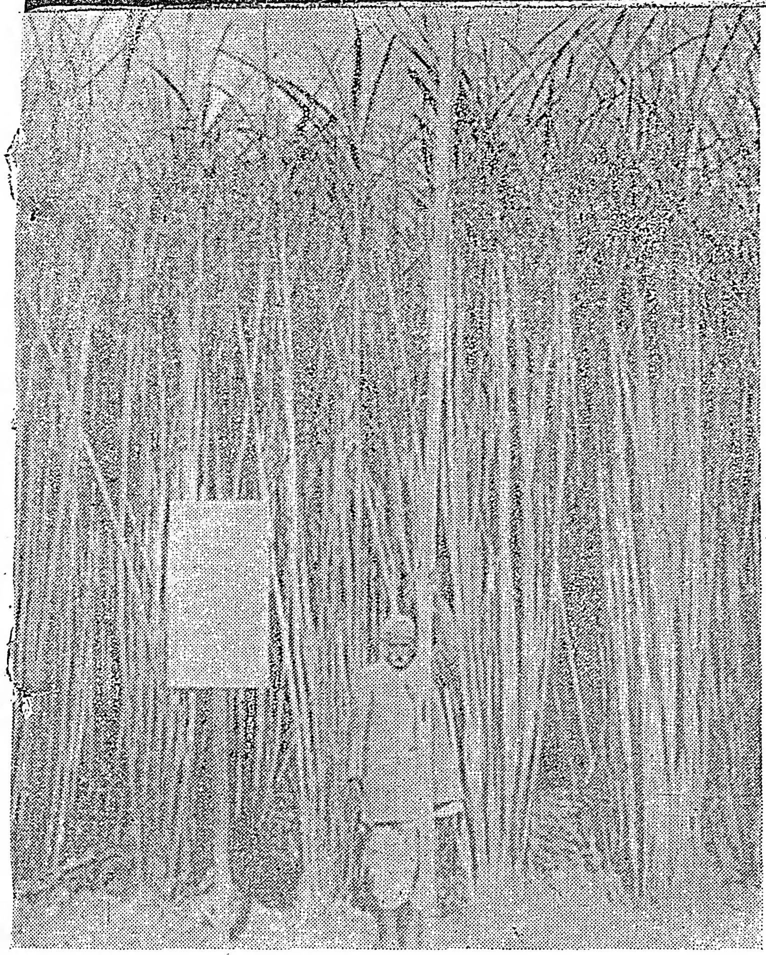
Intensive schemes for developing sugarcane have already been launched by the Indian Central Sugarcane Committee, and various State Governments with very good results. Yet, much more effort has to go in before we improve the production of sugarcane.

HIGH YIELDS

One important factor capable of improving sugarcane yields is the application of manures and fertilizers. Inadequate manuring appears to be one of the chief reasons holding up sugarcane yields at present in this country. Manurial experiments conducted in all the important sugarcane-growing areas have provided sufficient information to draw up manurial programmes for the crop. Thousands of tons of organic manures and chemical fertilizers are being distributed to cane-growers. Though quite a large number of cane-farmers have taken well to fertilizers, the average cane-grower, especially in North India, is yet to become fully fertilizer-minded.

Sugarcane is a crop that responds very well to manuring. Whenever a field is not manured or fertilized, the lack of nutrients in the soil can be

This is how an average crop of sugarcane in Uttar Pradesh lool

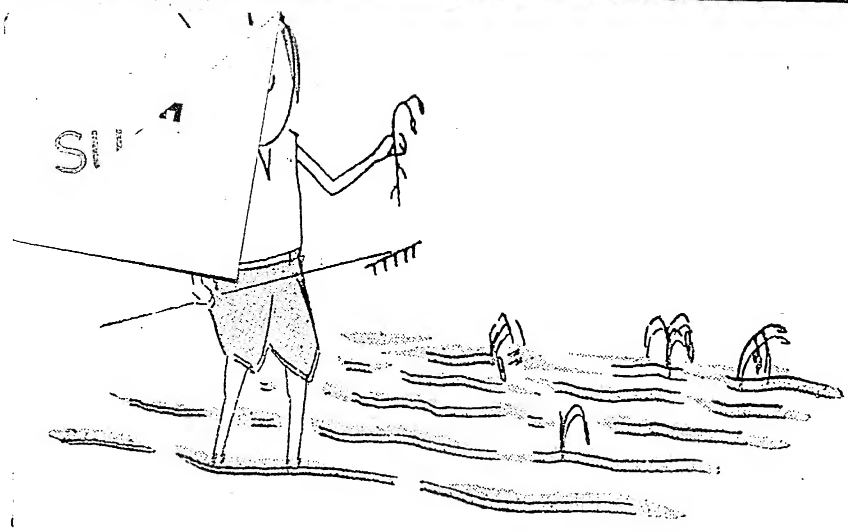


This is Shri Niadar Singh with his prize-winning sugarcane crop. He obtained an acre-yield of 1,803 maunds

easily noticed by the poor growth of the crop. [Experiments have shown that nitrogenous manures and fertilizers have very good effect on sugarcane. Experts recommend an application of 80 to 120 lb. of nitrogen per acre for Northern India and a dose of 300 to 400 lb. nitrogen for Peninsular India.]

The Government of India is formulating plans for inaugurating a campaign for increasing sugarcane yields throughout the country. During the current year, however, concentrated efforts are being made in the low cane-producing states of Uttar Pradesh Bihar and the Punjab to increase the per acre-yieds. Farmers are being encouraged to apply a top-dressing of ammonium sulphate to the present standing crop of sugarcane at about 2 maunds per acre and the fertilizer is being made available in these states on a loan or deferred payment basis to cover a lakh of acres each in Uttar Pradesh and Bihar and about 20,000 acres in the Punjab. Besides, arrangements have also been made to distribute 23,100 maunds of ammonium sulphate free in these states for demonstration purposes in the fields of selected cane-growers.

Farmers in these areas should do well to respond wholeheartedly to this scheme, and not only help the country produce more sugar to meet her requirements but also help themselves to better profits.



VEGETABLES NEED TO BE DISEASE-FREE

VEGETABLE farmers all over India come across diseases that cause reduced yields of the crops they grow for the home or the market.

A constant watch has to be maintained for the appearance of these diseases, and immediate action taken to check them if the crops have to be saved.

Many of these diseases can be controlled by the use of chemicals that kill the fungi that bring the disease. However, there may be cases where no remedial action is possible. In such a case, the only possible action that the farmer can take is to pluck out all plants infected with the disease and burn them so that the disease may not spread or the fungus remain alive. Such infected plants should not be thrown in manure pits, as a manure thus contaminated will be the cause for the start of the disease once again.

The vegetable-grower has many diseases to contend with. It will pay him to be able to know what particular disease it is that has attacked his crop and how to treat it.

POWDERY MILDEW

One of the common diseases that affect vegetables is powdery mildew. The foliage of plants like peas, tomato and brinjal sometimes are coated with a powdery ash-coloured substance. The disease causes the leaves to fall off, young shoots to wilt and die and prevent buds from developing or opening out into blossoms. Affected plants should be collected and burnt. Spraying Bordeaux mixture on the crop is the best-known remedy for mildew.

For preparing Bordeaux mixture, take the following ingredients :

5 lb. copper sulphate
5 lb. quick lime
and 50 gallons water

Place 40 gallons of water in a barrel, add 5 lb. of copper sulphate to it and dissolve it completely. Slake 5 lb. of quick lime by adding a little water at a time and make up the volume finally to 10 gallons. Add the copper sulphate solution (40 gallons) to the 10 gallons of slaked lime, stirring well. Use at once. Wooden vats are best for mixing. This Bordeaux mixture goes by the formula 5-5-50. For smaller quantities, use proportionate quantities of the ingredients.

A solution of potassium sulphide is also found effective. The general strength of the solution recommended is one ounce in three gallons of water.

DOWNY MILDEW

It is a disease similar to powdery mildew, with the difference that a downy, soft film covers the affected portions of leaves, making it all the more difficult for fungicides to act on them. Beginning as minute dots, the disease spreads rapidly. Big variations in night and day temperatures generally bring on the attack. To control, use Bordeaux mixture or lime sulphur solution.

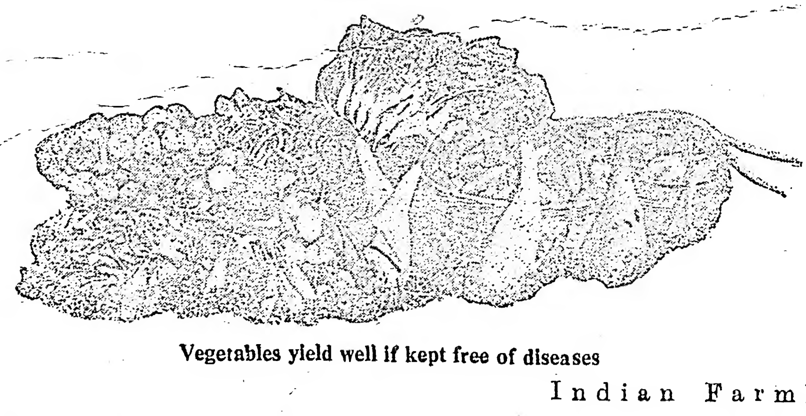
Lime sulphur solution is prepared by slaking 4 lb. of fresh lime in an earthen vessel stirring it gradually, adding 8 lb. of fine sulphur, using enough water to prevent burning.

It is then allowed to boil for about 15 minutes by the heat of lime. Then more water is added and allowed to boil for some more time. This mixture is diluted to 50 gallons and applied.

If lime sulphur solution is mixed with lead arsenate, it can be used against both insects and diseases.

RUSTS

Several kinds of rusts attack vegetables, usually cucurbits, tomatoes being the common victims. The disease can be identified by the appearance of yellow or orange or brown or dark spots on the stem and sometimes on the leaves too. Once the attack sets in, it is difficult to control rusts. Preventive measures like plant sanitation, good cultivation and preventive spraying usually can help in giving the crops protection.



Vegetables yield well if kept free of diseases

It is common to find rotting of roots, stems and fruits of cucurbits, tomatoes and artichokes. The usual cause for such a rot is over-watering, defective drainage or heavy texture of the soil. In soils where rot is common, disinfection by digging in lime will be of great help. Fruits susceptible to rot can be given a preventive spraying with Bordeaux mixture after they have set, but before they become large and ripen.

"DAMPING OFF"

Young seedlings often rot at or below the surface of the ground and fall over or wilt when they are known to "damp off". This is common in nurseries of tomato, brinjal, cauliflower, cabbage, etc. Adequate drainage, careful watering and thin sowings usually keep off the disease. Sprinkling sharp sand or charcoal powder over the surface of the soil helps in preventing the attack. Spraying with a very weak solution of formalin (formaldehyde, which is a poison) is also recommended.

Other diseases commonly seen in vegetables are what are known as little leaf, rosette, mottled leaf, die-back, etc. These are found more especially in soils which are dry, sandy or hard and deficient in organic matter. Application of well-rotted cattle manure, horse dung or urine helps in overcoming the diseases.

Sometimes a gum is seen exuding from the stems or roots of plants. This is known as gummosis. The bark from diseased portions should be cut out and a paste of Bordeaux mixture applied to these parts.

CHLOROSIS

When the foliage of the crop is seen in a pale yellow condition, it is called chlorosis. This is usually due to the lack of some substance such as boron, iron or copper in the soil. This condition can be rectified by applying small quantities of boric acid or ferrous sulphate (at the rate of 1/4 oz. per square yard) or by spraying Bordeaux mixture on the foliage.

Mercuric chloride (one ounce in 10 gallons of water), is a useful antiseptic wash for seed material to prevent diseases. Uncut seed potatoes may be soaked in this solution for half an hour before planting to prevent diseases.

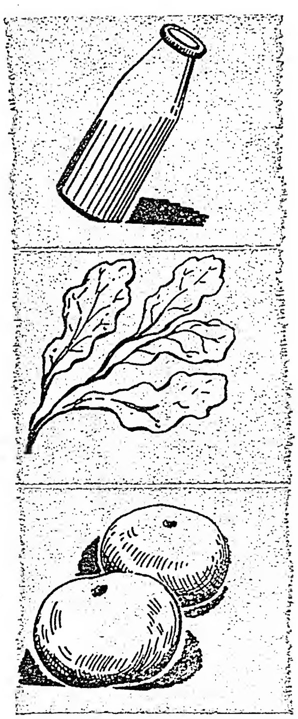
SHOULD A MOTHER FEED FOR TWO?

SOME HINTS REGARDING WHAT AN EXPECTANT MOTHER SHOULD EAT AND WHAT SHE SHOULD NOT

SHOULD an expectant mother eat for two ? The answer is yes and no. She should eat more of certain kinds of foods, but should not eat more than what she normally does.

Attention to the food of the expectant mother is important. The health and development of both mother and child will depend upon the nourishment she receives during the entire period of pregnancy.

The food she takes has to supply her own needs as well as those of the growing child. Naturally, she has to take some extra food, and not just what she takes usually.



The unborn baby draws heavily on the mother for the calcium it needs, the more so during the latter part of pregnancy. Calcium is needed for the building up of the bones and teeth. If the mother does not take extra calcium in her diet, the child's need for the substance will come from her bones and teeth. Thus both mother and child will suffer.

Just as calcium, the child needs iron, and draws heavily on her body store of iron. It is necessary that the mother's food should contain atleast fifty per cent more iron during this period.

The other important substances needed to be taken in the diet in larger quantities to ensure a good health both for mother and baby are proteins and vitamins.

RIGHT FOODS

Among the foods that supply these essential food factors to the mother, milk is the foremost, especially in the case of vegetarians. Milk is rich in vitamins, minerals and first class proteins. The expectant mother, nutrition experts advise, should drink as much milk as she can afford. Milk can also be taken as curd or butter.

Green leafy vegetables are also rich in vitamins and minerals. It is good to include them in the diet. Fresh fruits and sprouted gram deserve to be taken daily, even if in small quantity. Eating more of vegetables and fruits will help a good deal in relieving constipation which is generally common during the last two months.

Non-vegetarians can help themselves to moderate quantities of fish, meat and eggs and liver. Moderate, because these foods being rich in proteins, are more difficult to digest. It is good to cut them down still further in the last month of pregnancy.

RIGHT QUANTITY

The quantity of food should increase a little at the beginning of the fifth month, while during the last two or three months it is better to have four or five small meals instead of three heavy ones.

After the sixth month, the diet should chiefly consist of milk, green vegetables and fruits, and the quantity should be reduced during the last month.

The expectant mother can take tea, coffee and sweets in moderation. She should avoid over-eating, foods that do not agree, fried foods and alcoholic drinks. Watch weight. The mother should not gain more than a pound a month during the period.

WHAT'S NEW IN FARMING

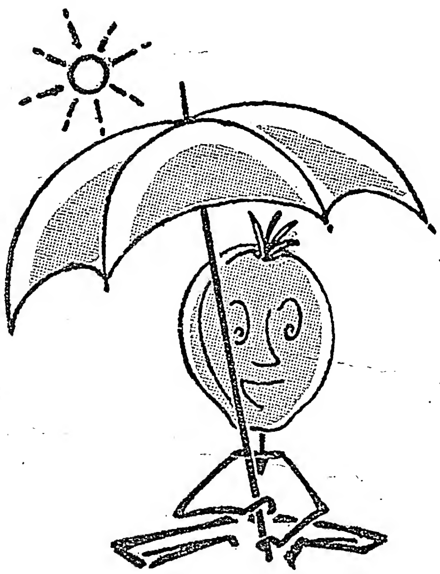
WHEREVER farmers raise coconut nurseries, they have to provide shade to the growing seedlings.

Shading is necessary to protect the seedlings from the scorching heat of the sun and minimise watering charges, as shade reduces evaporation of soil moisture.

Plaited or unplaited coconut leaves and bamboos are generally used by coconut-gardeners for shading coconut seedlings during the hot weather. Such shading material, apart from being costly, does not last for more than a season.

Efforts were made at the coconut research stations to find out suitable plants that would provide suitable shade to the seedlings and also could be grown as a live-hedge.

Sesbania speciosa and Agath (*Sesbania grandiflora*) were tried at these stations with good results. Sesbania was sown in rows in-between 5 to 10 rows of seed coconuts planted in each nursery bed. Agathi seeds were dibbled along the borders about four feet away from the nursery. Both the plants grew up well and proved to be excellent shade material.



Sesbania is a quick-growing plant, capable of putting forth an excellent vegetative growth and providing excellent shade for the seedlings. Two crops can be raised in a year (June-July and October-November), which can remain in the field till the flowering stage, when they can be cut and utilized for green manure. The plants do not require any special attention.

Agathi is also a quick-growing plant, the trunk growing erect and forming an ideal standard for fencing. Apart from protecting it from goats and cattle, the plant does not require any special attention.

Both these plants, apart from being a cheap means of providing shade to the seedlings, can also bring a small subsidiary income to the farmer.

INDIGENOUS INSECTICIDE

The powder of the rhizome "sweet flag" (*Acorus calamus*) has excellent insecticidal properties, experiments at the Central Rice Research Institute at Cuttack have shown.

Sweet flag powder was used at the Institute to control the insect pests of stored paddy. In the experiments, its efficacy was compared to chemical insecticides in use at present.

The chemical insecticides were dusted on bags of paddy at the rate of 1 lb. per 100 sq. ft. surface. Sweet flag powder was mixed at the rate of 2 lb. per 100 lb. of paddy. Results showed that the insect population was the least in grains treated with sweet flag. Loss sustained due to insect damage was again the least in the lot mixed with sweet flag powder.

In the method of applying the powder it was found that mixing the powder at 1 lb. per 100 lb. of paddy was found better than dusting the same on the bags at 1 lb. per 100 sq. ft. surface.

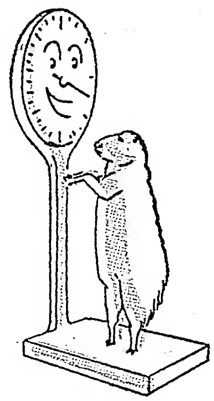
Even after the rice was treated with sweet flag and stored for a year, it did not show any unpleasant odour when cooked.

SHEEP AND WEIGHT

Sheep lose up to 15 to 20 per cent of their body weight during the scarcity periods extending from the last week of December to the end of February in the Punjab. This is partly due to the shortage of grazing and partly due to the cold weather. Experiments conducted at the Hissar Farm show that a combination of the following rations in the form of supplementary ration to grazing can help in avoiding the loss :

Crushed *guar* seed two ounces per animal combined with 12 to 14 ounces of hay, or *pala* leaves, or chaffed *guar* or fine wheat *bhoosa*.

If these are not available, 3 lb. of green berseem per animal per day will serve the purpose.



THE MINISTER HAS A WORD....

Excerpts from the circular letter of Dr. Panjabrao Deshmukh, Union Minister for Agriculture, to Ministers of Agriculture of all States

IF anywhere our farmers are slow to take to new methods, it is essentially due to lack of means, and hardly due to lack of desire. I, therefore, entertain much hope to repeat the success we attained in the field of better paddy cultivation with respect to other crops also.

I have already chosen sugarcane, and some steps have already been taken in this direction. I also want to take up *jowar*, *bajra*, cotton, jute and *ragi*. Wheat will follow in due course.

The fulfilment of this hope, it is obvious, requires a constant and hard work on the part of everyone concerned. There are many pitfalls we have to avoid, and many precautions to take.

Considerable responsibility in this has to rest on the shoulders of us all, and more so on the officers of the Agricultural Departments and the large number of people who will go out as Extension and Village Level Workers in our rural areas.

If the machinery we possess is fully geared up, and works with a singleness of purpose, I am confident we will have as astounding results with the other crops as we have had with paddy.

HIGH PRIORITY

You will agree that variety is no longer a factor limiting the yield of sugarcane in India. Coimbatore canes have now become world renowned. I am convinced that inadequate manuring is the factor holding up crop yields in the country, and in our programme of cane development, the creation of proper organizations for manure supply will be given the highest priority. High stress will be also laid on the provision of irrigation facilities. Co-ordinated efforts of state Governments, factory interests and development workers are needed to achieve a greater average yield.

Uttar Pradesh is undoubtedly the most important sugarcane-producing State in India, since it produces more than half of the country's cane. The average yield, however, is about half that of Hyderabad and Saurashtra, and much less than half of Andhra, Bombay and Madras.

Andhra, which produces the highest yields (except in 1951-52 when Bombay held that position) shows a consistent increase in averages, and Madras has come up well in 1953-54. Assam, Bihar and Mysore, on the other hand, show a progressive decline in yields.

Hyderabad and Bhopal's areas have been halved since 1951-52, and the acreage in Andhra, Uttar Pradesh, Madhya Bharat, Madras, Rajasthan has shown a steep fall. Saurashtra, like Andhra, has shown considerable improvements in yields.

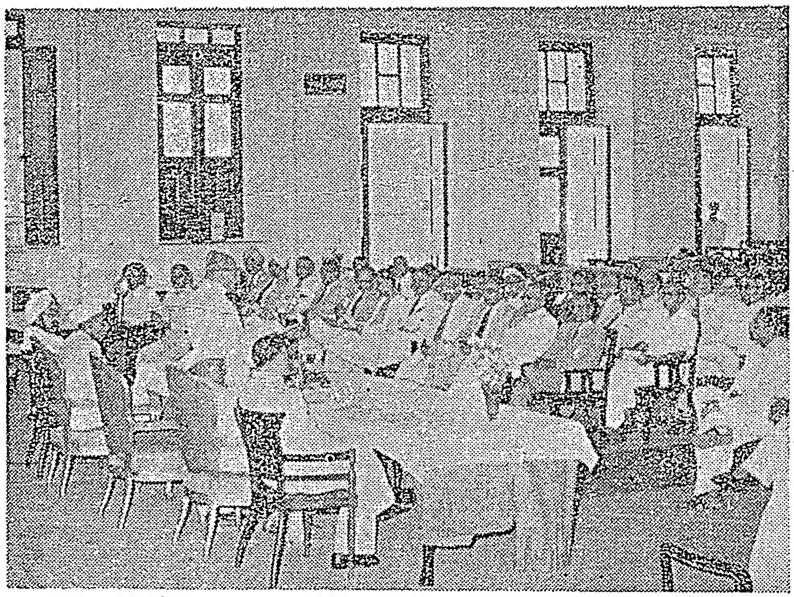
It has, however, been shown that there is ample scope for increasing the yields throughout the country, except perhaps in some parts of Bombay, Andhra and Madras where the yields are good. Even here, a little more effort will surely pay. It should not be difficult for us to increase the average yields by some 25 per cent.

COCONUT YIELDS

The average annual production of coconuts of 3,400 million nuts in this country is not adequate for our present needs necessitating the import of some 55,000 tons of copra annually. According to estimates our increased demands can be met if an additional annual production of 80,000 can be reached during the second Five-Year period.

This target, again, is not difficult of achievement. I am assured that even if adequate plant production measures alone are taken, and

Dr. Panjabrao S. Deshmukh, Union Minister for Agriculture, addressing the Opening Session of the Crops and Soils Wing of the I. C. A. R. at Bangalore in April last. He pleaded for a freer flow of information from the laboratory to the field so that quicker improvement in Indian farming could be achieved



the nuts which are capable of ripening are protected, it would be reached without bringing any additional area under the crop.

Our first aim should, therefore, be aimed at an extensive and efficient plant protection service for the entire coconut-growing area, so hat our average production of 29 to 30 nuts per tree may be increased to 40 nuts per tree.

RICE POSITION

Reverting to rice, I find from available figures that India's acreage under rice is 45.5 per cent of that of Asia (excluding China) and 32.6 per cent of the whole world (excluding U. S. S. R.). The total production, however, is just over a third of Asia and just above a fifth of the world. Regarding average per-acre production too we occupy a low place. Malaya has 50 per cent more yield per acre than India, while Formosa has 2½ times as much. Burma is ahead of us by 25 per cent. South Korea has thrice, and Japan nearly four times our per-acre yields.

I have given these details only to point out the important position we occupy on the rice map and the immense possibilities we have of wiping out our rice deficit.

It is indeed gratifying that we have been able to achieve good progress already in this field. When we consider the 1953-54 figures, we find that our acreage has gone up to 76.6 million acres and production to 38.5 million tons. Imagine, a mere five per cent increase over this yield will mean 20 lakh tons, which can not only meet our needs, but also give us a certain amount of surplus. In terms of the Japanese method, it means putting an additional four million acres under the method, which at the most conservative estimate of half a ton of additional yield per acre, should give us what we want.

Two million acres fully and 4 million partially under the Japanese method would be another way of achieving the same result.

(Continued from page 17)

Transplant young seedlings, nine inches to two feet or more in height, depending on the age, during July-August or earlier if irrigation facilities are available. Older saplings develop deep roots in the nursery, which are sometimes damaged in lifting; the lower portion of such roots should preferably be pruned at transplanting. To establish the transplants sprinkle water after transplanting if there is no rain. As a live fencing, it is advisable to plant two adjacent rows about 20″ apart, spacing the plants one foot apart in the rows. The plants in the two rows should preferably be planted alternatively. During the first year or two the young plants are liable to be damaged by termites under dry conditions. A closer planting is, therefore, recommended so that the final stand does not look very thin.

The basal side branches of young plants, which tend to grow prostrate, may be trimmed off leaving the main shoot to develop into a trunk.

When planted as a fencing for the farm, regular pruning after the second or third year is desirable so that the crops growing by the side of the hedge are not affected by the shade of overgrown Mesquite plants.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

Editor

COTTON COMES TO THE ANDAMANS

RESULTS OF PRELIMINARY EXPERIMENTS POINT TO NEW POSSIBILITIES

By **K. DHARMARAJULU**

WITH a geographical situation more or less similar to the West Indies, and with a rainfall ranging from 50 to 60 inches, the prospects of cotton cultivation in the Andaman Islands appear to be bright. One significant feature, which was evident from the few trials undertaken in recent years with Sea Island and Kidney cottons in those Islands is the absence, for the present, of any serious pests or diseases of the cotton crop.

After the visit of the Vice-President, Indian Council of Agricultural Research, to the Andaman Islands, a suggestion was made that cotton might be included in the list of crops that might be tried in the Islands. Seeds of the Sea Island and Kidney cottons were supplied in 1949 by the Secretary, Indian Central Cotton Committee, for trial.

The reports of the Agricultural Officer, Port Blair, indicated that the seeds were sown in the middle of June, 1949. While the germination of Sea Island was poor, that of Kidney was quite satisfactory. The plants after a poor start showed rapid growth after September and reached a height of 3 to 3½ feet, with good branching. The cottons came to harvest by the middle of January, 1950, and pickings continued till March. The yield of Sea Island was calculated to be about 50 lb. and that of Kidney at 80 lb. per acre. Except for some slight damage by a borer, there was no major attack by any pest or disease. Samples of Sea Island and Kidney cottons were sent to the Technological Laboratory for examination.

The experiments with these cottons were conducted at the Junglighat Farm, where it was grown on terraces. The soil of the Farm lands was poor, being gravelly. The rainfall was heavy, with a very short dry period intervening. The second lot of seeds was sown in May, 1951, over an area of 60 cents, the spacing between plants being six feet in the row and six feet between the rows. The crop was harvested in December of the same year. The yield obtained was extremely poor. Subsequently, the plants were ratooned and necessary weeding and inter-culture were carried out. These ratooned plants were in full bloom in the month of October, 1952, and a few bolls were produced. About 60 bolls were collected during the succeeding months of November-December, 1952, and January, 1953.

It is stated that the low yield was due to the heavy shedding of flowers caused by cyclonic weather at flowering time. Furthermore, weed growth is said to have been very luxuriant, in spite of measures taken to check their growth. Side by side with Sea Island and Kidney cottons, a few plants of Moco were also raised.

Notwithstanding the rather poor performance of the Sea Island and Kidney cottons, about three pounds of seed of the former are said to have been distributed amongst the cultivators, and another 2½ lb. sown on the Government farm for multiplication of seed. An attempt appears to have also been made to grow it in coconut plantations, and its performance under these plantations appeared to have been much more encouraging. It has also been suggested that the trial of the annual varieties also would be worthwhile. It is proposed to try some of the long duration types, which can stand a period of heavy rains in these Islands.

In this connection, a few of the promising American cotton types, *viz.* H. A. 11, M. 4, Madras Uganda 2, Acals 44, Delta Pine, Messilla and H. 105 which had been included in the cotton varietal trials conducted in the vicinity of Bombay, where the rainfalls is as high as 90 to 100 inches, might with advantage be tried in these Islands. The results with these annual cotton varieties will be watched with interest.

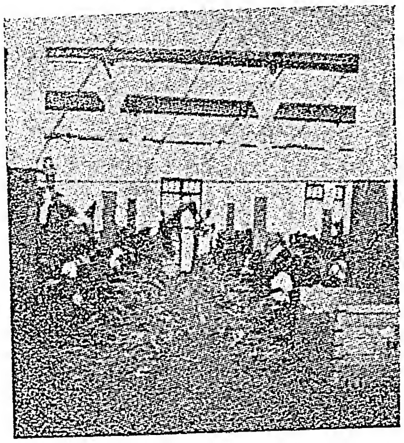
GRADING TOBACCO BY "AGMARK" STANDARDS

The way quality tobacco is assured to buyers at home and abroad

By

P. L. TANDON,

Chief Inspector, Tobacco Grading. Guntur



Grading of tobacco leaf is in progress. Plenty of care, patience and practice are required for this work.

THE Indian Union today is one of the principal tobacco-producing countries of the world occupying the third place after the United States of America and China. The total area under tobacco during the year 1952-53 was estimated at 1.01 million acres with a total yield of 870.42 million lb.

Though both the species of *Nicotiana tabacum* and *Nicotiana rustica* are cultivated in India, the former plays a far more important role in the foreign trade as well as in the tobacco industries of the country. The average annual exports of tobacco from India amounted to 86 million lb., valued at 13.25 crores of rupees during the five-year period ending March, 1953. The average annual quantity of tobacco cleared for home consumption for the corresponding period amounted to 471 million lb.

Under the cigarette type, Virginia tobacco of varying degrees of excellence and quality is produced in the country. The high colour of the Indian Virginia leaf has given it a distinctive place in the tobacco industries of the United Kingdom.

CULTIVATION

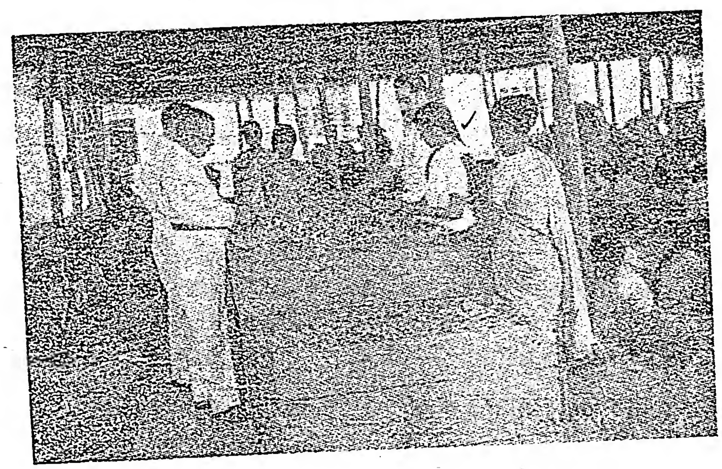
Virginia tobacco seed is sown in the month of August on specially raised 6" high seed beds of 4′ × 50′ dimensions, using 2½ lb. of seed per acre. Beds are worked out with sand and manures to facilitate good germination and growth. When the seedlings are about 5 or 6 weeks old, they are transplanted, usually in the month of October and November at 27" × 27 or 33" × 33" spacing (about 8,000 and 5,760 plants per acre respectively). The crop is rain-fed and not irrigated. The harvesting is done from the end of December to the beginning of March, 8 to 10 weeks after transplanting, picking the leaves, as and when they mature, in 5 to 6 pickings. The leaves are strung together with jute twines. A slat of 5′ length is used for tying 14 to 18 pairs of bunches of leaves, each bunch containing three leaves.

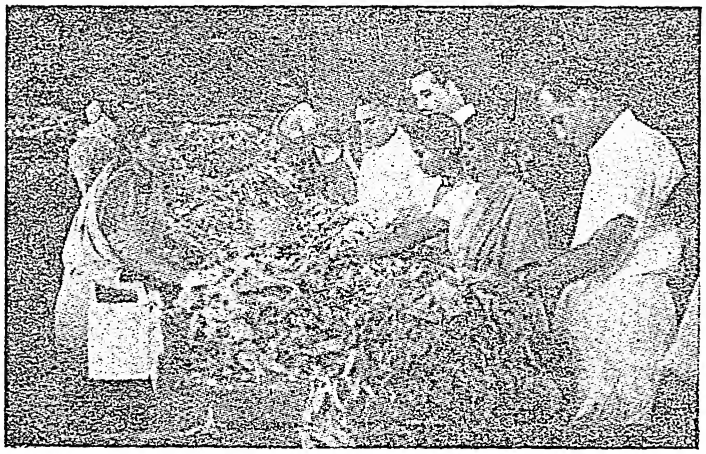
CURING

The bulk of the Virginia tobacco produced is cured in flue-curing barns. The main principle of barn curing is to dry the leaf under controlled conditions of humidity and temperature whereby the required lemon yellow colour and aroma are obtained.

The barn is a masonry structure of the dimensions either 20′ × 20′ × 20′ or 16′ × 20′ × 20′ provided with a furnace, a door, observation windows and top and bottom ventilators. Flue pipes of mild steel run from the cast iron pipe attached to the furnace into the barn along the sides and at the centre to provide the necessary heat. Twenty-one to twenty-five racks are arranged in the barn in 4 or 5 tiers on which the strung slats are loaded. The usual capacity of a single furnace barn is 500 to 600 slats.

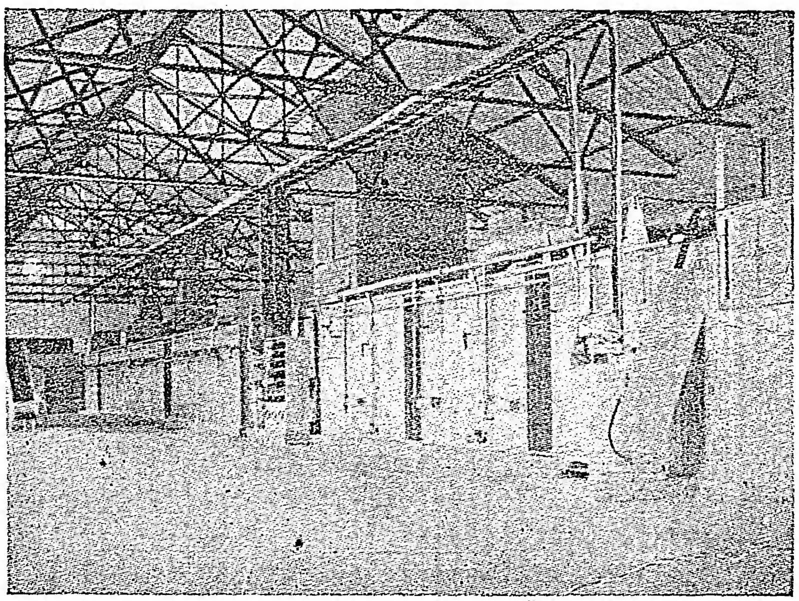
Graded tobacco is being carefully checked





Checking of the Grades is thoroughly done before tobacco is sent for bulking

Leaves are stemmed after grading. Here the work is in progress



Graded tobacco is sent to factories such as this for redrying to bring down the moisture-content

The curing is done in three stages : (1) yellowing the leaf, (2) fixing the colour and drying the leaf and (3) drying the mid-rib.

Yellowing : The temperature is kept at 90 to 100° F. Throughout this stage, the door and ventilators of the barn are closed. Leaves gradually turn yellow within 30 to 40 hours.

Colour fixing : Temperature is gradually raised from 100 to 120°F. It is at this stage that the yellowing of the leaf is accomplished. The top and bottom ventilators are opened to remove the moisture for rapid drying of the leaf. This takes 10 to 12 hours and then the temperature is gradually advanced from 120 to 150°F. The total time taken in this stage is 40 to 45 hours.

Drying the mid-rib : The ventilators are gradually closed again for conserving the heat and the temperature is advanced to 160°F and kept at that level till the mid-ribs are dried. This takes 30 to 35 hours.

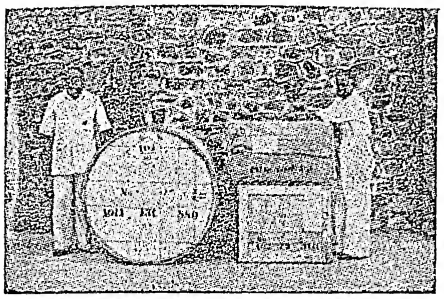
The whole process of curing takes 100 to 120 hours. The cured leaf when taken out is dry and brittle. So it is kept overnight on racks in the sheds to become soft and pliable for easy handling. The leaves are then removed from the sticks and piled.

For sun-curing, tobacco leaves are strung together with jute twines and hung in the sun on open racks. The leaves gradually turn yellow or brown and dry in a month. Precaution, however, must be taken to see that they are not damaged by rain.

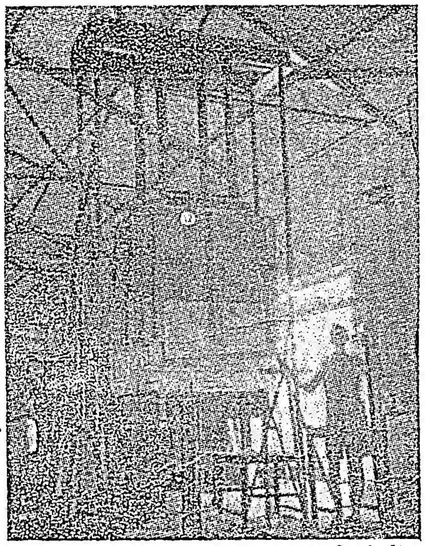
GRADING

The tobacco-grower usually takes his produce to the purchaser in a roughly graded form. At the grading centres it is sorted out and graded according to different Agmark Grades.

This grading is done on the basis of colour, texture, body and condition of the leaf. For example, for the Agmark Grade 1, the colour of the leaf must be bright lemon or bright orange ; the texture should be fine and the leaf must be com-



Redried tobacco is packed in bales cases or hogsheads



A chain or hydraulic press is used for baling

Each tobacco package is opened and samples are inspected from different layers to determine the grade

pletely free from any blemish or scalding or sponginess, etc. The colour and texture specification for Grade 2 leaf is almost the same, but blemish up to 5 per cent is permitted. For Grades 3 and 4, however, yellow to light orange colour has been specified and the texture should be medium with 10 and 25 per cent blemish, respectively.

Women are usually engaged for this work as it requires a lot of care, patience and practice. In the grading hall, the women sit on the floor in rows. For each row, there is a woman Line Supervisor who issues the tobacco for grading. When a worker has graded about one pound of leaves, she ties the leaves of different grades in different bundles. The Line Supervisor collects all the bundles separately discarding any bundle which is not graded properly. These are shown to the Head Supervisor who examines each bundle again and picks out any odd leaf not falling into a specific Grade. The leaf bundles are then taken to bulking rooms, checked again and bulked. In large concerns, the graded tobacco is removed to tables where the check-graders examine it carefully and transfer it to cases or for bulking.

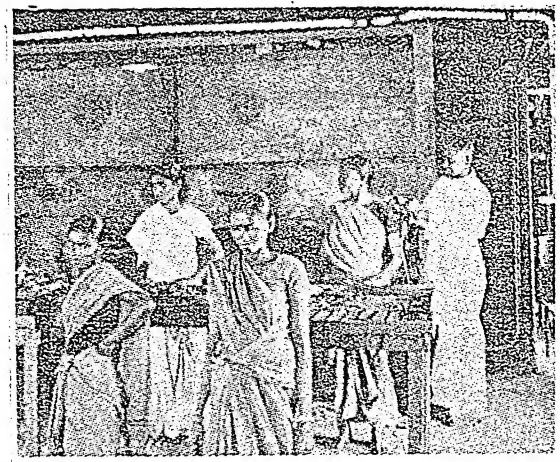
The leaves after grading are stemmed by removing a ⅔rd portion of the mid-rib or at least 50 per cent of the length of the leaf. The leaves after the removal of the mid-ribs are known as strips. This is done by hand or with a V-shaped knife fixed to a deal wood box.

REDRYING

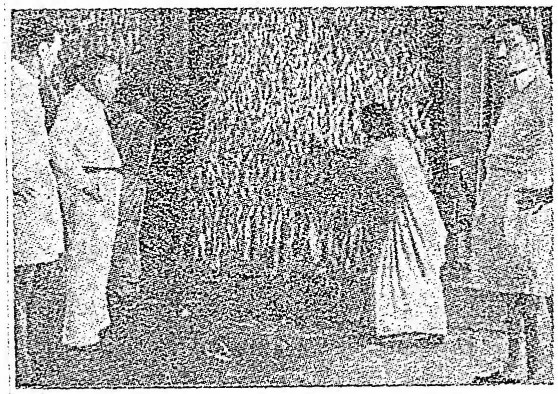
The graded tobacco is sent in baskets or cases to the factories for redrying. The main purpose of redrying is to bring down the moisture-content in the tobacco to a point where sweating and aging may take place without adversely affecting the quality. The most ideal range of moisture-content in tobacco is 10.5 to 11.5 per cent.

The redrying plant consists of three distinct sections : (1) Dryer, (2) Cooler and (3) Orderer. The tobacco is passed through the various chambers by means of an apron.

The Dryer in most of the factories is worked at 160 to 180°F depending on the type and the grade of tobacco. In this chamber, the tobacco be-



...t the redrying factory, frequent sampling is done to check purity of the grades



...Workers are seen sampling a lot of graded tobacco

comes more or less bone-dry and may contain 6 to 7 per cent moisture. The tobacco then passes to the cooling chamber where it is cooled and the temperature in the chamber is maintained at 100°F. Finally, it passes into the third chamber known as the "orderer" where only steam at low pressure or steam and water in the form of a fine spray are injected simultaneously to form a mist so that the required amount of moisture is absorbed by the tobacco.

Redried tobacco is packed in bales, cases or hogsheads in lumps of 220 to 250 lb., 350 to 440 lb. and 880 lb. respectively. The baling is done by either chain or hydraulic press. In the case of bales, waterproof paper, mats and gunny cloth are used to cover all the sides. For cases, only water-proof paper is used. In hogsheads, no paper is used at all. Packages are weighed, numbered and stencilled with weight and grade as assigned by the grading officer and other marks.

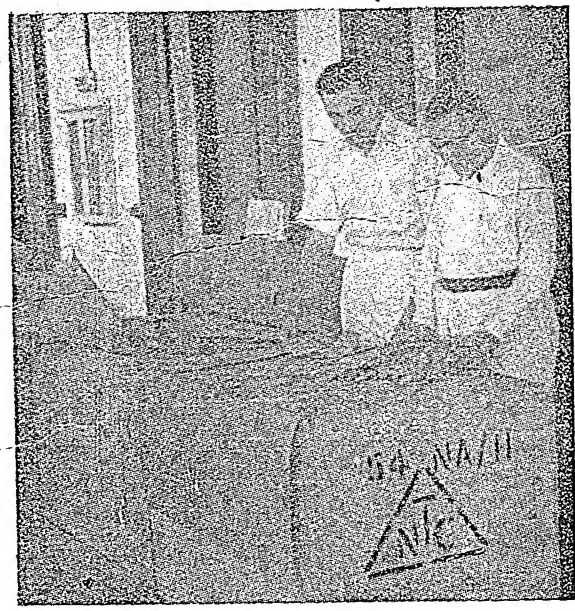
EVILS IN TRADE

Till the last ten years or so, the quality of tobacco shipments from India was not often up to the required standard and there were frequent complaints from overseas buyers. The marketing survey conducted by the Agricultural Marketing Adviser to the Government of India also revealed immediate need for standardizing the methods of grading and packing of tobacco. The first step towards the improvement of agricultural marketing in India was the passing of the Agricultural Produce (Grading and Marking) Act in 1937. Further steps could not be taken due to the War. An Indian Tobacco Association was formed at Guntur and a scheme of voluntary grading of tobacco was introduced in 1937. This, however, could not attain any success. The evil of palming off of doubtful qualities of Indian tobacco to the English market prevalent in the tobacco export trade, therefore, remained unchecked. Consequently, considerable quantities of Indian tobacco were held up in the United Kingdom ports pending settlement of disputes regarding quality.

The abuse of mixing inferior grades and adulterating tobacco with extraneous matter increased so much that it was feared that Indian cigarette tobacco would lose its foreign markets for ever, thus impairing the country's reputation in the international trade. Meanwhile, the Indian Tobacco Association, Guntur, introduced a system of certification of tobacco consignments by a certifying committee to have some quality control over the exports.

...e packages being labelled at the baling press. This is done under the direct supervision of an inspecting officer.

Graded and marked tobacco is being check-sampled by senior officers before it is sent for shipment



Even about the working of this Committee, there was a good deal of dissatisfaction. Finally, the Government of India prohibited the export of flue-cured Virginia, sun-cured Virginia, sun-cured "Natu" (country) and Motihari varieties of tobacco unless they were graded and marked in accordance with the rules framed under the Agricultural Produce (Grading and Marking) Act of 1937 and certified to that effect by an officer authorised for the purpose. The grades prescribed under the Agricultural Produce (Grading and Marking) Act are known as "AGMARK" grades. The grade standards were defined in due consultation with the trade interests in India and also the foreign buyers.

AUTHORISED PACKERS

Any person or firm desirous of grading and marking tobacco is required to apply for a certificate of authorisation on a prescribed form to the Agricultural Marketing Adviser to the Government of India, New Delhi, through the Chief Inspector, Tobacco Grading, Guntur. A duplicate copy of the application is also required to be submitted to the State Marketing Officer of the state where the applicant desires to carry on the grading operations. The Marketing Adviser after satisfying himself about the *bonafides* of the applicant issues the certificate. Certain conditions are imposed on the authorised packers and those who fail to observe the rules and instructions are liable to forfeit their authorisation.

The correct grading of tobacco under the rules prescribed is the responsibility of the authorised packer. The Tobacco Inspectorate is also required to see that all consignments of tobacco exported out of India conform to the prescribed standards. With this object in view, the Inspectorate keeps a continuous watch on all the operations, namely, grading, stemming and redrying and the actual packing of tobacco.

ISSUE OF CERTIFICATES

The inspection of tobacco packages is done by opening each package and drawing samples from different layers to determine the grade.

At the redrying factory, as each lot of different grades of tobacco is run through the redrying machine, frequent sampling is done at the feeding and delivery ends of the machine, and also before the tobacco is passed through the baling press. The Agmark Grade labels are applied to each package at the baling press under the direct supervision of the inspecting officer. The labels are issued in duplicate to the authorised packer by the Inspector. One is inserted in the inner side of the package while the other is fixed on the outside. The package is then sealed under the supervision of the Inspector. The labels bear such particulars as variety and grade, year of harvest, date of packing and date of inspection. The Inspector puts his signatures on each label. The Agmark label also bears a serial number.

The graded and marked tobacco is check-sampled to the extent of 2 per cent or more, if necesary, by the Chief Inspector, Tobacco Grading or the Senior Inspector or any officer specially authorised for that purpose, before it is sent to the port of shipment.

As a further measure of safeguard, checks are also carried out by the Chief Inspector or other officers to detect any faulty grading or cases of deterioration of quality or weevil infestation in transit or storage. During this check-inspection, if the packages are found shapeless or broken or badly ground-touched or badly graded or overfermented or scorched, they are detained, labels and seals are removed and cancelled and the authorised packer is informed accordingly.

A certificate of Agmark grading in triplicate is issued on the prescribed form to the authorised packer after the tobacco has been labelled, sealed and check-sampled. The certificate includes such particulars as variety, year of harvest and Grade together with Agmark label numbers and the party's shipping numbers and identification marks.

"AGMARK" SUCCEEDS

The average annual quantity of tobacco graded for export for the five-year period ending March 1953, works out at 88.7 million lb., valued at about Rs. 10.5 crores. The Agmark system of grading tobacco is playing a very important and useful role in developing the tobacco export trade of the country on sound lines. It has increased the confidence among the foreign buyers about the quality of tobacco shipments and enhanced the reputation of the country in the international market for delivering goods in accordance with standards of quality. Due to this increased confidence, the foreign buying firms freely advance large sums of money to Indian exporters for supplying tobacco on the basis of Agmark Grades.

Some of the buyers in the U. K. have placed firm orders for the supply of Indian tobacco. Letters of Credit for the full value of tobacco are opened in the local banks and such credits are operted by the Indian shippers on the production of certificate of Agmark grading together with the shipping documents.

Many of the cigarette manufacturers in India also prefer to buy their requirements of unmanufactured tobacco on the basis of Agmark Grades.

The foreign buyers now offer price quotations on the basis of Agmark Grades so that the farmer is able to know whether the price offered for his produce in the local market is fair and reasonable.

The variations in prices realised by different exporters for different grades have been minimised. The price differences from grade to grade have become more or less uniform.

Increasing recognition is being accorded to the Agmark grading certificates by the local banks and financial agencies who readily advance monies on the pledge of graded and marked tobacco.

Questions & Answers

Q : Mango trees in my garden bear flowers, but no fruits are produced. Can you indicate any reason for this ?

A : It is presumed that the trees in your garden not only bear flowers but also set fruits. It is quite possible that the fruits drop off when small. If this is the case, in all probability it is due to a deficiency of nitrogen in the soil. It may also be due to some pest like the mango hopper which causes fruit to drop. In any case, it is advisable that the local Agricultural Officer is contacted and his help sought to eradicate this trouble.

Q : Please let me know whether applying one bag of ammonium sulphate, one bag of superphosphate and one bag of lime to my paddy crop will have a good effect ? I intend applying half a bag of ammonium sulphate to the nursery and half a bag to the crop after transplantation.

A : Lime is applied to correct the acidic nature of soils usually in Bengal, Madras and Orissa. Unless you are sure your soils are acidic, you need not apply lime. It is presumed that the above doses you have given are for an acre. In that case, half a bag of ammonium sulphate to the nursery is too high a dose. You need apply 20 to 25 lb. of ammonium sulphate to the nursery. Application of 80 lb. of ammonium sulphate to the crop generally gives an additional yield of 2 to 3 maunds per acre. Regarding superphosphate, a dose of 100 lb. per acre applied two or three days before transplantation gives good results. You may also note that application of nitrogenous fertilizers beyond 40 to 45 lb. of nitrogen per acre to the paddy crop is not only a waste but may also have a very depressing effect on the crop.

(*Continued from page 6*)

enabled the Dairy to flourish; this has again made maintenance of dry animals possible.

ANOTHER ACHIEVEMENT

The Japanese method of paddy cultivation is also a favourite with the "Adarsh". Rice on this Farm is generally cultivated by this method and the entire needs of the Farm staff are met from the produce obtained. The "Adarsh" won the first prize for obtaining a paddy-yield of 73 maunds per acre by this method, in 1952-53. The achievement becomes all the more significant when it is taken into consideration that an area of 40 acres was entered in the competition.

The partners believe in giving a sound agricultural education to their children so that they can be of actual help to them in running this business which they have been able to stabilise after years of hard work and patience.

When I left the Adarsh Dugdhalaya, I carried a lasting impression on my mind—the owners of this Dairy are working scientifically and in a spirit of service. It was easy for me to conclude that twenty years of hard work, planning and unswerving devotion to their ideals had enabled the three partners to realize their dreams. The Dairy, started on a very small scale about 20 years ago, has today bloomed into a huge organization and is one of the biggest private enterprises in the country.

Indian Farming

VOL. IV JULY 1954 No. 4

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

Editor's Page

PLANTING TREES

A few years ago, a Southern journal, claiming a wide readership, dismissed the tree planting campaign in its leading article as nothing more than a "fad". It went out at length to forecast that if pursued, the campaign will only entail in a big wastage of energy and money without bringing in any imperceptible benefits to the people.

Four years later, the same journal had a different story to tell its readers. In another leading article, it took serious notice of the growing menace of soil erosion, the dearth of fuel for rural homesteads, the lack of sufficient cattle fodder and the poor capacity of soils to bear good crops, and traced all these evils to the inertia shown by the people to tree planting. It fervently appealed to its readers to put in all efforts in re-planting the denuded countryside if things were not to go from bad to worse.

This swingover is just another example of how more people have come to realise the folly of thoughtless tree-felling without making any amends to nature. The upset balance in nature has brought in its train the series of evils that the rural dweller is today experiencing—erratic rains, fodder and food famines, fuel scarcity and poorer crops.

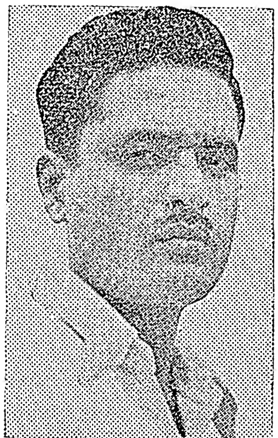
The realisation has not come a day too late. For years, the individual has been under the conception, though wrong, that the planting of trees is the concern of the Forest Department and he need not bother about it. The fact that the individual constituted the state and that he had to play a valuable role in rural reconstruction was not paid enough attention.

No progressive nation in the world can afford to neglect its forests. This is all the more so in a country like India where the majority of the states are yet to put the optimum area to tree raising. In many a country the celebration of 'arbour days' has served to focus public attention to the need for fresh plantings and on an increased measure. This work benefits the individual as much as the nation.

In tree-planting, apart from community action, the individual and especially the rural dweller can and should play a bigger part. In some of the Western countries stress is being laid on the raising of what are called 'farm forests.' Here, the farmer sets apart a portion of his land exclusively for the raising of the trees for which he has immediate need in the home or the farm. Such farm forests can be so planned as to serve other purposes as well. The forest can be a wind-break, a shelter for the farm cattle, apart from adding to the charm of the landscape. The idea of raising a farm forest should, therefore, appeal to those farmers who have a sufficient holding to apportion a part of the land for this purpose. For those who do not have this advantage, there are quite a number of places on and about the farm such as farm boundaries, field bunds, pasture lands and sides of canals. Farmers, big and small, should make it their duty to raise trees, with utility as the main deciding factor in the selection of the species, in greater numbers and thus defeat those factors which are playing havoc with farm and rural life.

OUR COVER

"Line-planting would give better tillering of the crop." These Village Level Workers are explaining to a farmer the advantages of adopting the Japanese System in rice cultivation. Today, Village Level Workers are playing an important part in the plan for agricultural development in India's villages.



MAKING THE BEST OF POOR RAINS

"EVEN when we used to receive a normal rainfall, my wells used to go dry and remain dry when I still needed water for cultivation. Now, with even half the average rainfall the last three years, my wells are giving me copious water sufficient for my irrigational needs."

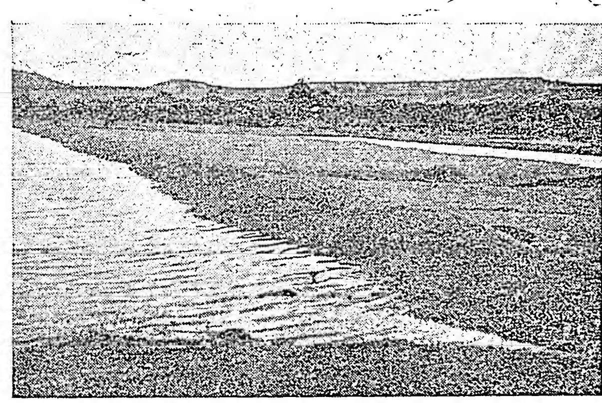
This was what Shri Ravindra Wandrekar, a farmer in the Poona district of Bombay State, told me when I met him in the first week of this month.

The farmer, who had lost the dread for scarcity conditions, disclosed to me that what made the big difference was the putting up of contour bunds on his farm. Good, well-built bunds all over the farm locked up rain water, which instead of flowing away to waste and taking some good soil with it in the process, now sinks into the ground and is available to the growing crops.

The bunding work was got done cheaply, efficiently and quickly because he sought the help of the Soil Conservation men of the State Department of Agriculture. Since the area of his farm was less than the minimum required for the Department to undertake the work, he had to persuade his neighbours to join him in getting the farms bunded.

The farmers who had not very readily agreed to join him in his plan then have now, after what they have seen during the three years, realised what a valuable help bunding is in farming.

Shri Ravindra is a Graduate in Agriculture and is one of the few educated men that have preferred farming to other vocations.—**M.G.K.**



Rain water caught by the bunds. The picture was taken after a shower.

Man of the Month

METHODS THAT HELPED DHANDA FARMER RAISE RECORD MAIZE CROP

by

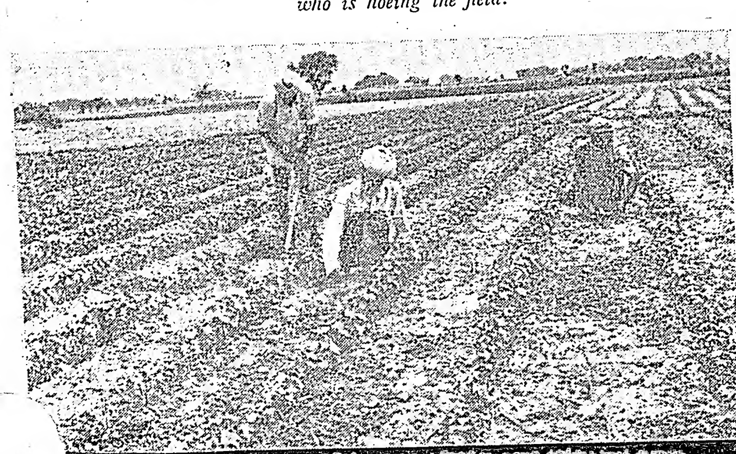
HARKIRAT SINGH

DHANDA, a small village in tehsil Phillaur of the Jullundur district in the Punjab, has today the distinction of possessing a very progressive farmer in Sardar Basant Singh whom I met recently. Modest and shy by nature, this 65-year old farmer has leaped into fame by producing a remarkable yield of maize amounting to 120 maunds 37 seers and 4 chhataks from an acre as against an average acre-yield of 20 to 25 maunds in the area. This won him the first prize in the crop competitions held at the tehsil level in 1951-52.

A ready smile from none else than the Sardar himself greeted me as I, led by his son, approached the field where he was busy hoeing and thinning out his recently sown cotton crop. The sweltering heat of the summer sun did not seem to bother him at all. I was greatly struck by the zeal with which he seemed to apply himself to work in spite of his old age.

"I have come here to know from you the secret of your success," said I, opening the conversation, "and how you managed to obtain such a high yield of maize".

The farmer thinning his line-sown cotton. To his right is his son, who is hoeing the field.



Sardar Basant Singh

"I will tell you all about it. Let us sit on that *charpai* under shade.

"In fact, I only follow the simple rules of farming such as a good preliminary cultivation, a liberal use of manures and fertilisers, timely irrigation, use of good seed and, above all, bestowing personal attention on the crop. I believe in working with my own hands."

"You will rarely find him absent from his farm," confirmed the local agricultural official accompanying me.

"So, in raising my prize-winning maize crop", continued the Sardar, "I made it a point to conduct all the operations involved in the best possible way."

METHODS ADOPTED

Thereafter, he explained to me in detail the methods followed by him. I was told that the prize-winning

crop of maize followed the berseem crop of *rabi* 1950-51. In the second week of June, after harvesting the berseem crop, the field was given four ploughings and 35 tons of farmyard manure was applied. About the first week of July, nearly three inches of rain was received and the farmyard manure was scattered in the field in the second week of the month. The seed was sown in the third week after giving two more ploughings, the seed rate being 10 seers for an acre.

Good cobs from the maize crop previously raised on the farm were selected and kept for use as seed. The advantage of keeping the cobs in this condition was that the grains remained free from any insect attack.

The first irrigation was given after two weeks followed by two hoeings. Some rain was received thereafter and two more hoeings were done. After this, the second irrigation was given and one hundredweight of ammonium sulphate was applied. At flowering time, one more hundredweight of ammonium sulphate was applied with the third watering and another hoeing was given. A fourth watering was given after about five days and another hundredweight of ammonium sulphate wes applied at the time of grain-formation. Three more waterings were given at intervals of five to six days after that, and the crop was harvested in the third week of November.

"It does not matter how many waterings you give, but it does matter whether the waterings are given when the crop needs them," said the Sardar. "And you will like to know that six out of the total eight waterings were given by me after the flowering stage had set in as that is the most appropriate time for irrigating the crop. Another factor that contributed towards the high yield was that the harvesting of the crop was intentionally delayed for a few days so that the grains matured fully and did not shrink afterwards. There were two to three cobs on each stalk and fortunately, nothing untoward happened to the crop".

GROWS SUGARCANE TOO

Sardar Basant Singh, however, does not specialise in growing maize only. He is an all-round progressive farmer interested in improved methods of agriculture and raises other crops such as cotton, wheat, grain and sugarcane, as well. In fact, as regards sugarcane he is considered to be one of the best farmers in the area.

After the day's work. The farmer does not neglect the feeding of the work animals that serve him so well in his farm operations.

The farmer beside his sugarcane crop. He is considered one of the best sugarcane farmers in the area.

He has been raising sugarcane for over 40 years now and has improved his yields from year to year. The maximum that he had obtained was 1,363 maunds per acre in 1951-52. The pumping set for irrigation installed on the farm with a subsidy of Rs. 2,000 out of the Cane Development Funds in 1951 and the use of the variety Co. L. 9 recommended by the Department have a great deal to do with the success of Sardar Basant Singh in raising sugarcane.

When questioned as to how he actually carried on the various operations involved in sugarcane cultivation, Sardar Basant Singh told me that first of all, five to six preliminary ploughings are given to the land to bring it to a fine tilth. The first ploughing is given with a furrow-turning plough while the subsequent ploughings are done with a *desi* plough or a Kisan hoe (Triphali, as it is known locally) at intervals of three to four days. Sowing is done in lines two feet apart, that is, in alternate furrows made with a *desi* plough by dropping the setts behind the plough.

One month before planting, that is, in February, farmyard manure at the rate of 800 maunds for an acre is applied to the field. Besides, cattle are penned in the field whenever possible to enrich the land with their droppings. One hundredweight of ammonium sulphate is applied to the crop as top-dressing in two doses—in June and July. The total dose to be applied is divided among the various plots and is placed in the water channel, to be carried to the plants by the irrigation

water. In all, about 17 to 20 irrigations are given to the crop.

"Do you grow your own seed?" was my next question. "Of course, now I am growing my own seed of the variety Co. L. 9, the seed of which was first obtained from the Agriculture Department." He also told me that for a better germination, the seed was soaked in water for 24 hours before sowing. The setts were planted in straight lines but overlapping each other, and setts having two eyes were only retained. About 35,000 to 40,000 setts were needed to plant an acre.

Before germination, one blind hoeing is given and one hoeing and weeding are done after each irrigation during the first month. Earthing up is done with the break of the monsoon and the crop is tied up in August-September to avoid lodging. Harvesting continues from the end of November to March.

When asked about the pest attacks on the sugarcane crop, I was told that it was generally subject to the depredations of the pyrilla, the top borer and the stem-borer. While the pyrilla could be controlled by dusting BHC, a top borer attack could be combated only by selective cutting of the affected shoots and destroying the eggs and moths after picking them with hands.

In the case of the stem-borer, the spike-thrust method was adopted. This consists in pulling out the 'dead-heart', and thrusting a pointed spike in the cavity to kill the caterpillar hiding inside.

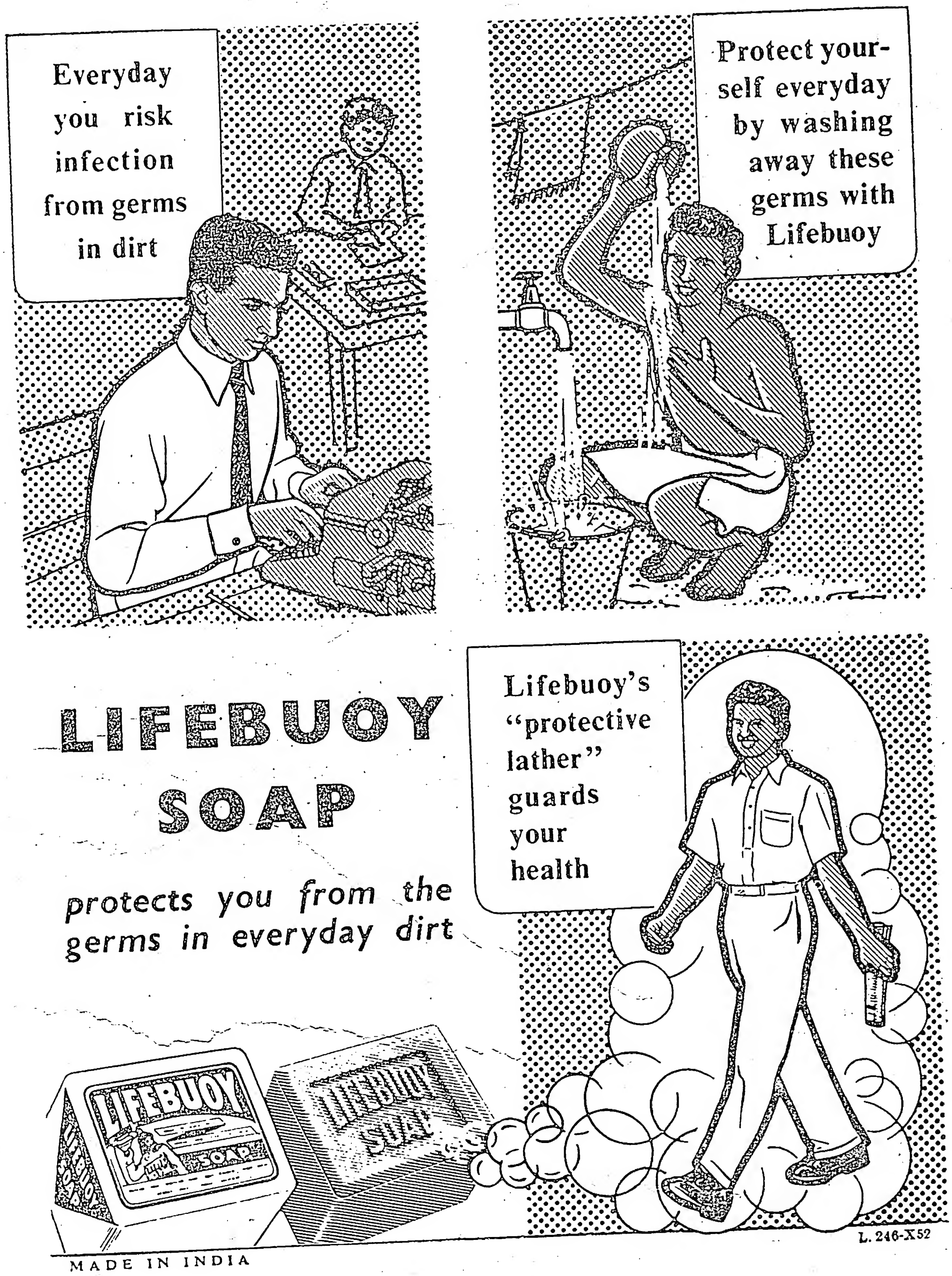
PROFITABLE VOCATION

The average recovery percentage from the cane grown on the farm is 10 to 12 per cent, i.e. about 14 seers *gur* are obtained from three maunds of cane. After keeping enough sugarcane for home use and seed purposes, the rest is either sold to the nearby sugar factory or converted into *gur*. In any case, the cane-farmers availing themselves of the benefit of subsidy from the Cane Development Funds are bound to offer 50 per cent of the produce to the sugar factory. For *gur*-making, Sardar Basant Singh uses an improved furnace known as the "Jullundur Special".

The cost of all operations from the preparation of the land to the transporting of cane to the sugar factory, I was told, comes to about Rs. 600 per acre, whereas the income from one acre amounts to about Rs. 1,400; thus leaving a net profit of Rs. 800 per acre. "In my view, there is no better business than farming, of course, if intelligently pursued," added Sardar Basant Singh, smilingly.

Yields obtained by Sardar Basant Singh in the other crops are not ordinary either. Newly-introduced 320 F, long-stapled variety of cotton, has given him about 20 maunds per acre as against the average of eight to nine maunds in the area, and wheat, 25 to 30 maunds as against the average acre-yield of 15 to 16 maunds. The cotton seedlings in the line-sown field presented a picture of perfect uniformity and reflected the deftness with which the work had been done.

(*Continued on page 30*)


Everyday you risk infection from germs in dirt
Protect yourself everyday by washing away these germs with Lifebuoy
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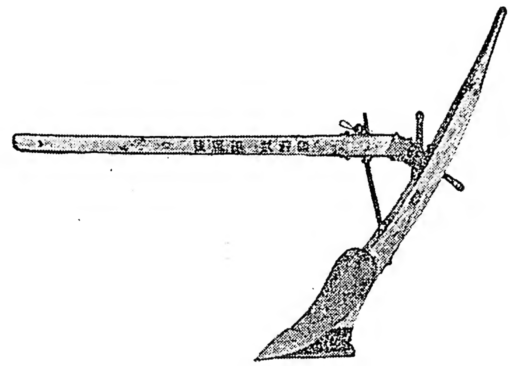
IMPLEMENTS AND MACHINES FOR RICE FARMERS

by

R. V. Ramiah



A Japanese rice land plough (drawn by a single animal)

In the small rice fields of Japan farmers use cheap, simple and mostly manually-operated implements and machines. Most farmers, because they do not maintain cattle, rely on hand-operated implements.

With the Japanese method of rice cultivation having found favour with our farmers, many of these implements could be used for our rice lands in India too, but this will mean some slight changes in our cultural practices so that they can be worked efficiently. Some of them require minor changes because of the difference in the size and shape of the paddy grown here and in Japan.

The Indian Agricultural Research Institute has been importing some of these Japanese implements from time to time for trial here. Some observations on these will surely be of interest to our rice farmers.

THE PLOUGH

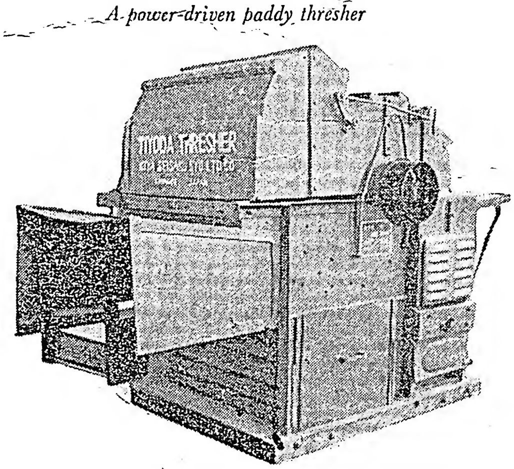
A steel plough is used in Japan for the rice fields. This plough seems to have some of the features of the country plough used by the Orissa farmer. It also has the mouldboard effect of the western plough. The hitching arrangement of the Japanese plough is different, however, from that of the Indian country plough. It has a short beam as only one animal is used for ploughing in Japan, as in some of the other Far Eastern countries. This naturally is a handicap here since our bullocks are always used to work in pairs.

The point of similarity between the Japanese plough and the Orissa country plough lies in the plough bottom. Both of them possess the suitability for working in land under water for puddling the soil.

Again, the plough used in West Bengal in the rice fields is very much similar to the Orissa plough. However, in most rice-producing states of India, the plough used for wet and dry cultivation is the same. In such states, may be, it will be worth while to try

A hand-pushed paddy drill used in Japan

A power-driven paddy thresher



The rice land plough from Japan or from Orissa.

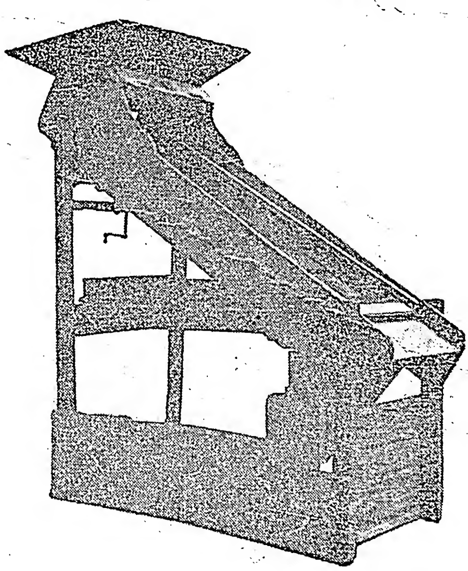
RICE LAND PUDDLER

There does not seem to be any specific implement used for puddling in the rice land in Japan. A wooden implement is being used in Burma for puddling in the rice land and also for crushing clods in the dry lands. In South India a firm is manufacturing a cast iron puddler which is being used in some of the states. Experiments are in progress on the possibility of using tractors and power implements for this purpose. A large mechanised farm in Gwalior has successfully been using a light wheel tractor for this purpose.

American scientists believe that puddling is not necessary for rice cultivation but this may be due to the very limited acreage (two million acres) under rice in the U.S.

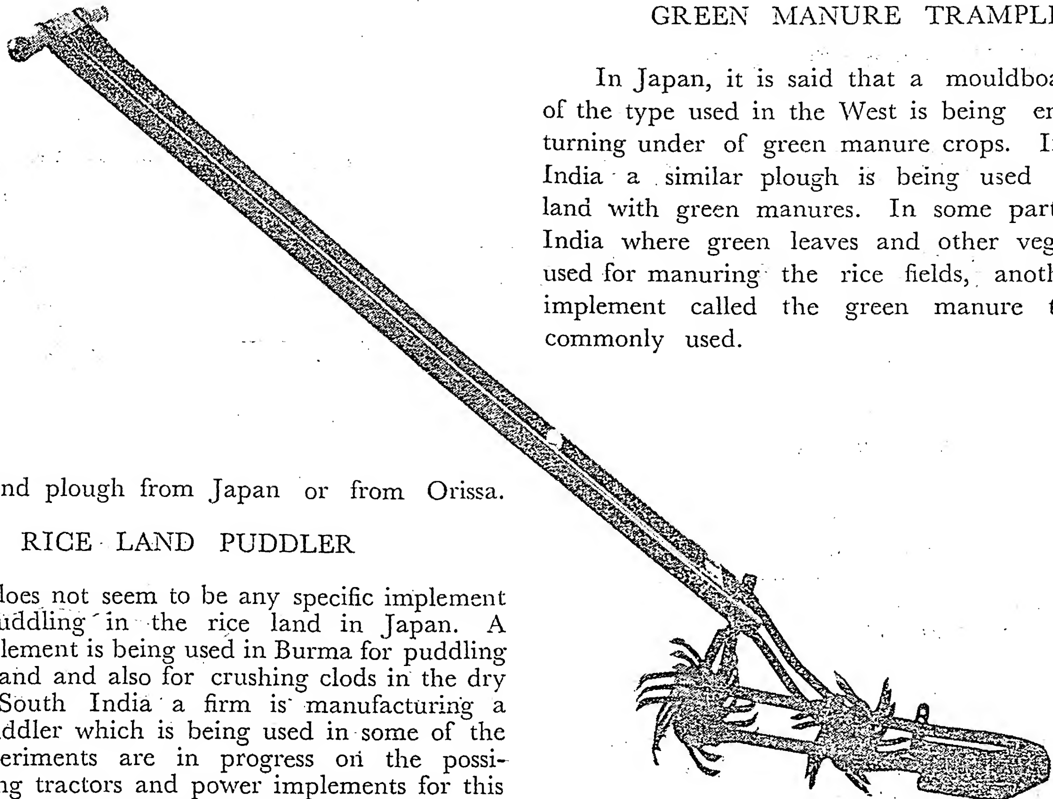
The puddler being manufactured in India is a very effective and labour-saving implement and may be tried with advantage.

A grain cleaner and grain grader



GREEN MANURE TRAMPLER

In Japan, it is said that a mouldboard plough of the type used in the West is being employed for turning under of green manure crops. In Northern India a similar plough is being used to fertilize land with green manures. In some parts of South India where green leaves and other vegetation are used for manuring the rice fields, another type of implement called the green manure trampler is commonly used.



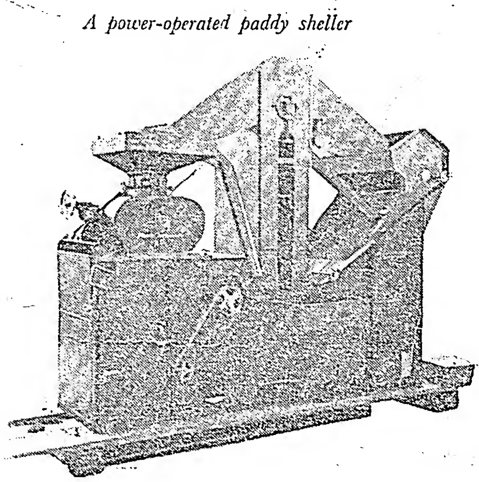
The Japanese type rice land weeder

SEED DRILL

A transplanted rice crop is known to give a higher yield than a broadcast crop. However, in Japan, seeds are sown mostly in rows. Seeding is done with a hand-operated paddy drill in fields with a little standing water and hence no furrow openers or earth-closing discs are needed. Because of the difference in the physical shape of the paddy fields in India the Japanese seed drill will need considerable modifications before it can be used under our conditions.

(*Continued on page 14*)

A power-operated paddy sheller



SPOT THE LEADER . . .

This is not a game, but only some practical hints to the village worker to help him find local leaders.

IF you are working in a village, and you are to succeed in the work you are doing, you have to solicit the full support of the real leader in the village. As village extension work is "helping people to help themselves," the recognition and useful guidance of a village leader become the foundation of good extension work. In other words, local village leaders are essential to the kind of work you are doing.

There are two kinds of village leaders. One has authority and the other has influence. Sometimes, this is the same man. Often, however, the villager who most effectively can influence the people is not recognised as a leader. People never think of him as a leader. Oddly enough, a real leader usually does not know that he has this influence.

If you know some of the qualities that make a leader, it will make your search easier. The real village leader believes in people and their desire to improve. He likes people and is liked in turn by them. He is eager to learn and willing to work. He is always willing to give credit to others for good work, and has friends among the young and old, rich and poor, in the village. He is dependable and is always willing to carefully discuss important village problems.

NAMES THAT MATTER

When you ask villagers to name somebody who will be good for a certain job, you will find them all recommending one or two names. If the job is important, the names recommended are likely to be the names of people with real influence. The best way of finding out the real leaders of the village is not asking the villagers to name them but to find them yourself by putting to the cross-sections of the villagers separately whom they would name to help you in such work as holding a demonstration or conducting a meeting. The common names given out by the various cross-sections would be more dependable.

It is important to recognise leaders who are already considered so by the villagers. If you have these leaders promise to help you, you have as good as the assurances of the villagers themselves. A demonstration put up by the leader is likely to be valued more by the villagers. On the other hand, if you get a leader in authority to do these things, you will have no good way of appraising the real effects of his leadership on the villagers.

TRAINING FOR LEADERSHIP

Once you have found the leader willing to help you in planning and organising village activities, get him to assist you in getting material for demonstrations and such other work as holding of meetings where views can be exchanged, conducting demonstrations and visiting places of demonstrations and centres of work.

In case the village has more than one natural leader willing to help you, get them both for your work. Help them develop leadership ability. Pay special attention to young people who are just beginning to grow into future village leaders.

In developing leaders, stay in the background and let them do the work as well as take the credit for the work. There are ways of showing how high you think of them and their work. Giving them publicity in newspapers, seeking their advice on important matters, allotting responsibilities to them, inviting them to accompany you on interesting visits, giving them a chance to meet interesting people who come with you to the village and visiting the demonstrations they are conducting are some of the ways which you may try. Inexpensive awards such as garlands, certificates, books and seeds may be given to them at public meetings held in appreciation of the work done by them.

Every village is a better community which has local leaders to help in village work. They are the persons who understand local situations well, have the ability to make more contacts, devote more time to work and stimulate others to follow them.

There are, however, some limitations to the use of local leaders in village work. For example sometimes a leader may give misleading information because he may be lacking in the proper training in or an intimate knowledge of certain

(*Continued on page 26*)

SOIL CONSERVATION-SOLUTION FOR BIDAR'S ILLS

Bidar, like many other places in India, is in sorry plight because of its failure to put land to proper use.

by
D.C. KAITH

MOTORING from Hyderabad to Bidar—the old city of domes—one becomes aware of the apathy the people have shown towards proper land utilization—thousands of acres of good land ruined by erosion.

None have bothered about the serious effects of soil erosion, except the local forest officials, who have been demonstrating how soil fertility could be rebuilt on the eroded uplands and the good farmlands in the valleys below saved from ruin.

Bidar in Hyderabad State is reputed to be one of the best districts, and here community projects have been carried out in a full-hearted measure and one part of the District has been constituted into a National Extension Service Block.

Yet, Bidar's sorry plight is due to its failure to put land into proper use.

Of the District's 29,31,321 acres, nine per cent is covered by scrub jungle of the open type. The so-called pastures occupy 4·5 per cent of the total, fallow lands too eroded to support vegetation occupy 7,64,253 acres or 26 per cent of the area and the cropped area occupies 17,43,651 or 59.4 per cent of the total.

This means that 31 per cent of the total available area is not being used to its full capacity, and this constitutes a potential threat to the agricultural land below.

The livestock strength of the District, comprising oxen and cows, buffaloes, sheep and goats totals 10,36,310. More than half the number are oxen and cows. Taking the total land available for grazing, a cow unit gets just ·15 acre. No animal can survive on ·15 acre of highly eroded land.

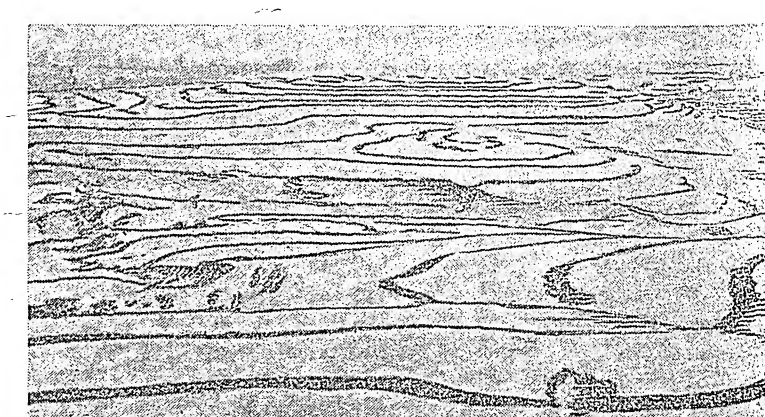
Bidar has 11,72,702 people, and taking one pound per day as the fuel requirement per person, the requirements for a year work out to 1,91,078 tons.

Most of the fuel required comes in the form of cow-dung cake, which means thousands of tons of cattle manure burnt every year, which rightfully should have gone to manure the fields.

The cause of Bidar's ills can easily be traced to reckless cutting down of trees, without effort to re-planting. With the reduction of vegetation, rainfall has been decreasing, wells have been drying up and yields have been on the decline.

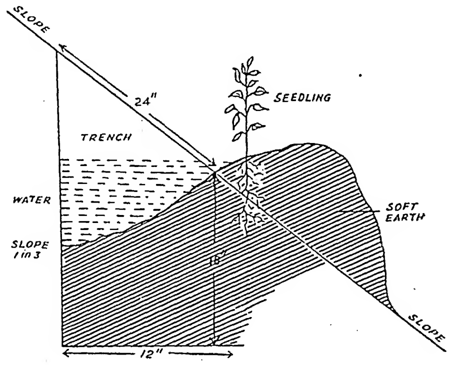
Forest officials have been fighting the evil, and have made a beginning in afforestation of the eroded lands in Bidar and other districts. Afforestation will prevent soil erosion, conserve water, create fuel and fodder reserves and protect agricultural land from further deterioration.

Bidar soils are red ferrugenous loams, changing in places to hard *murram* and *kankar* and intermixed with black soils derived from Deccan traps. The District receives an annual rainfall of 30 inches which is mostly received in the monsoon months of June to September.



A view of contour trenches dug and filled in Bihar

The Forest Department has been trying the afforestation measures in Blocks of Shahpur, Chetta and Honikery. The area which has one to three per cent slope, is trenched. The trenches dug are along the contour, are continuous, and are 2 feet wide and 1½ feet deep, and 60 feet to 150 feet apart.



These trenches are partially filled up with soil and a bund is formed on the slope side, giving a slope of one in three. Seeds are sown on the higher side of the slope. Gullies are "bunded" up by earth or stones to accumulate silt.

The trees selected for sowing are: *Melia azaderachta, Acacia arabica, Cassia Siamea, Albizzia lebbeck, Tamarindus indica, Terminalia balerica, Mangifera indica, Bombax malabaricum, Dendrocalamus strictus* (bamboo), *Tectona grandis* (teak), *Prosopis juliflora* and *Santalum album.*

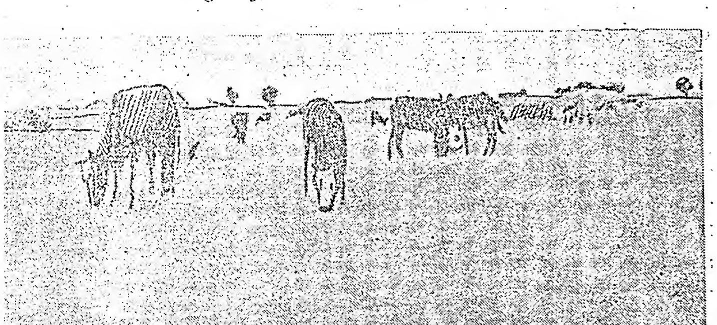
Trenching, filling in the earth and bunding are finished by the end of May and the sowing carried out in June and completed by the third week. Vacancies are filled in during the early monsoon months.

Three rows of seed are sown, one in the trench, one on the bund and one in-between the two.

Though a large number of species have been tried, a few of them will ultimately succeed, and it is the intention of the officials to plant these species on a mass scale. So far, *babul*, mango, the Cassias, bamboo and *nim* have shown good results.

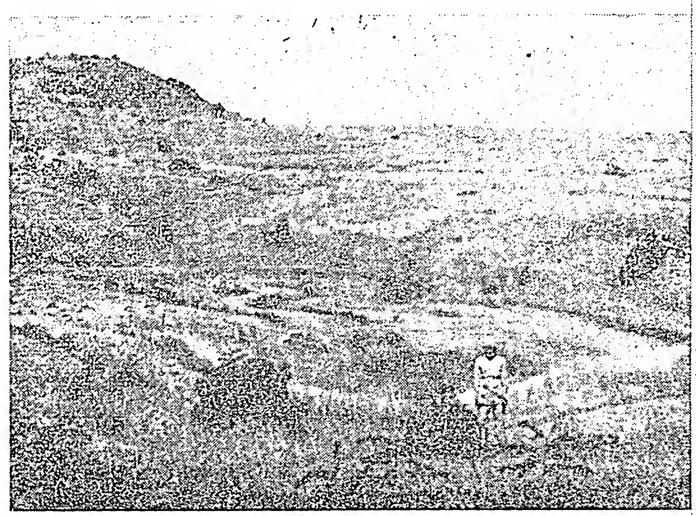
(*Continued on page 30*)

Bare eroded land where grass refuses to grow more than a few inches even in the rainy season. With cattle constantly pecking at the grass, nothing is left on this land except sheet rock.

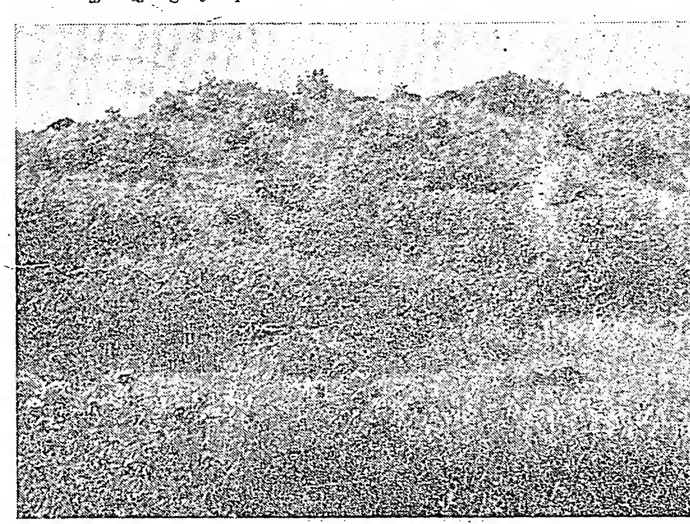


A view of the Shahpur afforestation area of 1947, in Bidar

Grass seen cut and stacked in the background of the picture. Con trenches and Cassia siamea *can be seen in the foreground as well as on slopes on the left and right.*



Bushy growth and grasses coming up naturally in portions of Bid effect of rigid fire protection and complete closure to grazing for seven ye



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RICE LAND WEEDERS

In our country, excepting for tiny hand-worked implements, no manually-operated or bullock-drawn implements are available for removing weeds from rice fields. The use of such machines, however, requires row planting. The Japanese rice land weeders are simple machines for weeding the rice crop. These manually-operated implements can be carried by one man and worked by a single person and continuously for eight hours without feeling exhausted. While effectively pulling out the weeds, they do not injure the rice crop. These weeders can usefully be employed in places where paddy is sown in rows or transplanted with 9 inches to 12 inches between rows as these implements are suitable for row widths of nine inches and above. Since the implements require atleast an inch or two inches of standing water, they cannot be worked in dry fields. In Japan when row widths are bigger, they use three or four row weeders pulled by a single animal. Two firms in India are manufacturing rice land weeders for Indian farmers.

PEDAL-DRIVEN RICE THRESHERS

Very effective though small rice threshers are being used in Japan. These machines are available in two sizes, one to be operated by a single person and the other operated by two. Both the types are pedal-operated. It is reported that with an additional attachment the threshers can be used for wheat, oats and barley also.

The threshers have a rotating cylinder on the periphery of which bent steel wires are fixed. When this cylinder rotates and the paddy ears are brought in contact with the steel wires, the grain is separated from the straw.

Agricultural Departments of most of the rice-producing states in India have tried these machines and though their opinion regarding its working is not unanimous, they have found it to be a labour-saving device. In such states where labour is cheap, however, these do not seem to be economical. Four Indian firms, at present, have started the production of the single person operated pedal type rice threshing machines, their sale price varying from Rs. 90 to Rs. 120.

POWER-DRIVEN RICE THRESHERS

Small engine or motor-driven threshing machines are also used in Japan. These are small enough to be conveniently carried on the shoulders of two men even on the narrow bunds of the rice fields. The threshers are so designed that the rice straw is not damaged in any way and can be retained straight and unbroken. This kind of straw is needed for the Japanese farmer for making mats and ropes because fibres are not available. This aspect of their design, however, is of no particular advantage in India because we do not make use of rice straw for any such purpose.

GRAIN GRADERS

In Japan, the farmers use grain graders, which do not depend upon wind for their working. The graders are used for separating weed seeds, chaff and dust from paddy grain after threshing. The grader can be hauled into the fields by two men. By using this machine the solid grains are separated from shrivelled ones and weed seeds are also collected separately. However, if these machines have to be used in India the grain screens will have to be modified to suit the size and shape of the paddy grain here.

PROCESSING PADDY

Straw and paddy are very economically made use of in Japan. For processing these, they have efficient machines of a cottage industry type. For straw three manually-operated machines are in use. They are the straw cutter, straw mat weaving machine and the straw rope-making machine. These machines are not described here as we do not make use of straw as the Japanese do. These machines, however, can be used for other fibres in India.

Three different machines are also used for processing paddy. They are the hand-operated paddy sheller, power-operated paddy sheller and the power-operated rice polisher. The paddy shellers remove the hull and do not affect the rice kernel in any way. The machines have a rubber band on the surface. This hard faced rubber can be renewed whenever needed. It is this rubber roller which is flexible that is responsible for the high turn-over obtained from the Japanese rice shellers. The rollers are adjustable for different sizes of grain. A firm in South India is manufacturing a modified type of rice sheller to suit our conditions and to give a better performance.

Rice milling machinery is produced in India since a long time which is also exported to Burma, East Africa and Shillong. This type of machinery is based on the original German design (Engleberg type) which is also in common use in the U. S. A. today, but Japanese machines are of small size, low in investment and better in performance.

The above machines were secured through the Indian Embassy in Tokyo for trial at the India Agricultural Research Institute, New Delhi. Some of these were presented by the Japanese Ministry of Agriculture and some were also sent by Messrs. Bannerjee & Co. of Japan. A catalogue of Japanese implements is also available from Messrs. Japan Advancement Association of Agricultural Machinery and Implements, Taito-ku, Tokyo. Some of the above machines are also described in the bulletin, "Agricultural Implements for Indian Farmers" issued by the Indian Council of Agricultural Research, New Delhi.

NO. 9 IS THE LUCERNE FOR YOU

(601 mds yield /Average)

by

H.C. Malik, Economic Botanist (Fodder), Sirsa

At the Fodder Research Station, Sirsa, District Hissar, variety No. 9 Lucerne has shown that it is superior to all other varieties tried, both in out-turn of green forage and recovery after cutting. The variety is finding a great favour now among Punjab farmers.

Lucerne, the Queen of forage crops, is one of the most important fodder crops of this State. It is the oldest perennial legume grown solely for green forage. Properly manured and inter-cultured, it gives a very good yield for a number of years. Seven to ten cuttings can be had in the course of the year.

It is a very good fodder for feeding livestock, especially work animals. It is a soil-improver and grows particularly well in a dry climate under irrigation. The crop, however, remains stunted during the monsoon season, as its growth gets restricted due to the intense heat and high humidity during that period. Except for this period the crop grows well and gives a continuous supply of fodder throughout the year.

Success in growing lucerne is very much associated with the variety used. No amount of good management can compensate for a weak and poor-quality variety used.

In lucerne the characters which are desirable are its high forage-yielding capacity, quick recovery after cutting, fine stem and leafiness, ability to withstand drought, good seed production and persistency of stand.

All these characters, however, are not found in any single variety, but experiments with 12 varieties of lucerne conducted at Sirsa have shown that variety No. 9 has the outstanding merits both for forage-yield and sprouting ability.

In the experiments this variety yielded 601 maunds of fodder on an average per acre in a year, the nearest to it being 346 maunds from another variety, S 10230.

When cuttings were taken at intervals of 21, 28 and 35 days, lucerne No. 9 gave per-acre yield of 453, 528 and 821 maunds respectively. This compared very well with the averages for all the varieties tried 184, 256 and 369 maunds per acre.

The experiments clearly indicate that no other variety would equal No. 9 in sprouting and ability to recover in growth after each cutting. Thus a farmer can depend upon this variety at all times of the year except during the heavy monsoon when there is ample grass to meet his needs.

Lucerne requires a well-drained, medium loamy soil. Seed is sown at the rate of four seers per acre broadcast or by drill in rows 1 foot to 1½ feet apart on a well-prepared seed-bed. The best time of sowing is from the middle of October to the middle of November. The first irrigation is given three to four weeks after sowing and later on at intervals of one month during winter and a fortnight during summer. The crop is ready for the first cutting in February and later on at intervals of 30 to 35 days. In all 600 to 800 maunds green forage per acre in 8 to 10 cuttings is

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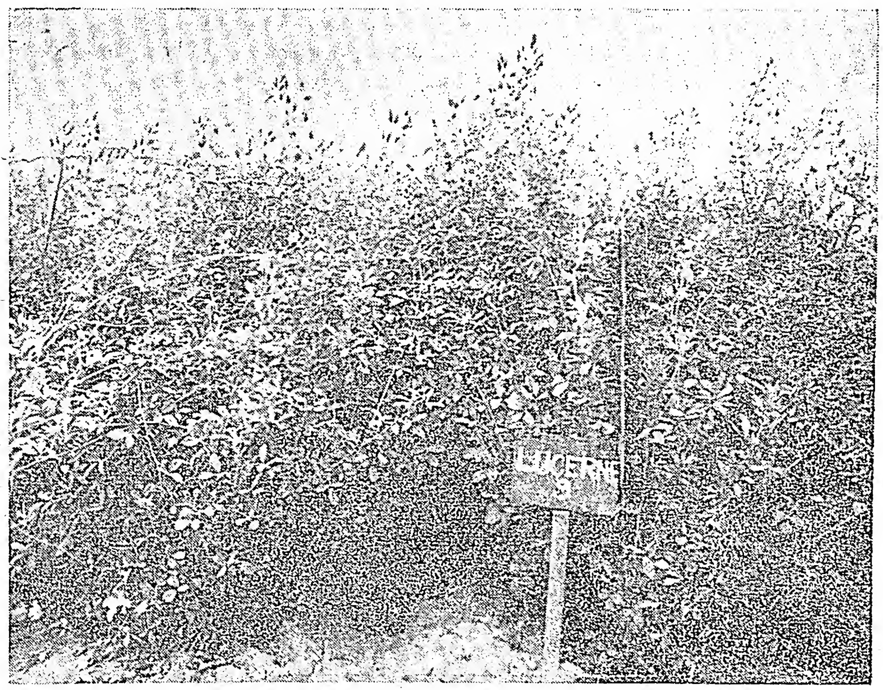
A crop of Lucerne No. 9



FILTER POINTS PROVE FRUITFUL

by

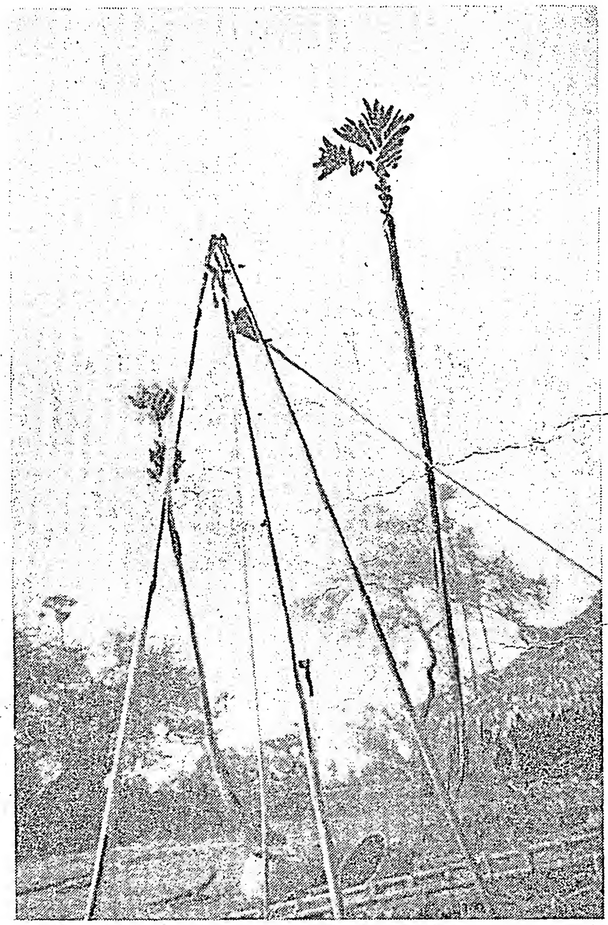
K. VEERABHADRA RAO

More and more farmers are installing filter points as a new way of getting water for a second paddy crop in the Godavary Delta

IN the Godavary Delta, the first crop of paddy is cultivated from June to October. The water from the irrigation system goes to waste from November to January, except where it is used for irrigating garden crops and green manures. This is so because no second crop of paddy can thrive during these cold months, as the wind from the easterly direction (called *thurpu gali* in Telugu) blowing at this time is very congenial for the paddy stem borer.

Efforts were made in the past to make use of this water for paddy during this period, but without success. So the second crop of paddy has to start only from about the middle of January.

Fixing up a filter point

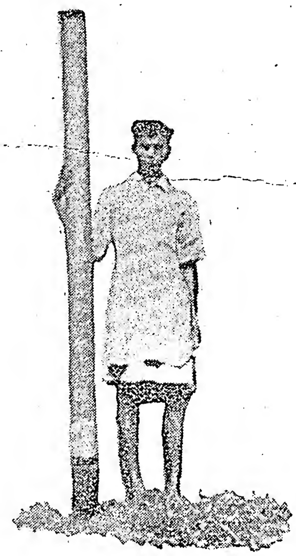


By the time the paddy cultivation starts, the flow in the river goes down, and since there is no reservoir, only a third of the Delta area gets water for the second crop. In some years, especially when the usual summer showers in March-April are not received, the second crop in this limited area also fails for want of moisture, as there are no wells or storage tanks either. Thus a very good land has to be kept waste for want of irrigation facilities.

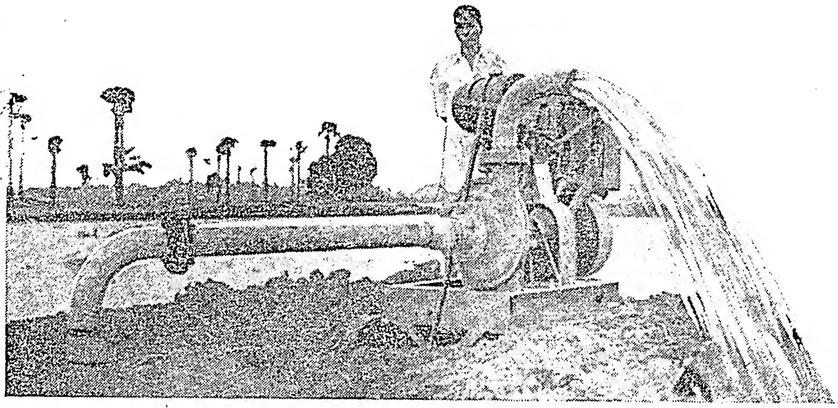
In 1952-53, when I was the District Agricultural Officer in East Godavary, I made an effort to try filter points as a source of irrigation in the summer months. The villages of Yeditha, Someswaram, Tapeswaram and Chelluru of Ramachandrapuram Taluk of East Godavary district were selected for experimenting with these filter points. In these villages, the water table is very high, being only 10 to 15 feet even during the hottest months. The water is sweet and the yield is considerable.

The first 10 to 15 feet of the soil here is alluvial clay. At a depth of 10 to 15 feet, coarse sand is met with. This sandy stratum is fully saturated with water which can easily be sucked through the filter points. This fine soil profile is brought about by the transported nature of the soils at the mouth of the great river Godavary. All this area is fully covered by water for over six months in the year by canal irrigation. It is only from November to May that the area is dry on the surface. These are ideal conditions for the working of the filter points.

The filter point consists of a triangular cast iron tip to which a cast iron or G.I. pipe is welded. Numerous round holes of $\frac{3}{4}$ inch diameter are drilled in the pipe. There are 700 to 800 holes in a 3 inches $\times$ 6 feet filter point. The pipe is then covered with a fine brass wire gauze which is reinforced by another covering of brass sheet mesh.



A filter point



Irrigating with a filter point

The filter points are simple to make and local village smiths were trained to manufacture them. At first three American "Wellworth" points were purchased. These were dissected and blacksmiths were asked to imitate them. Later on, filter points of various sizes, 3 inches × 6 feet; 4 inches × 6 feet; 5 inches × 7 feet and 6 inches × 8 feet, etc. were made locally. The triangular cast iron tips also were cast in a small foundry. In this way local talent was trained to manufacture the necessary equipment.

The fixing of the filter point is very simple. In the beginning, no special equipment was used for the purpose, and a wooden or an iron weight, like an old roller of a country sugarcane mill, was placed on the top and it was hammered down by two village blacksmiths. As this went down, necessary pipe lengths were fixed. The check valve was put in at the top of the water level.

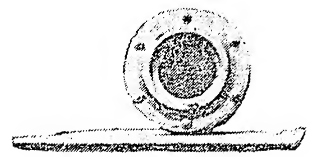
Later it was thought that it would be more convenient to fix the filter point above the ground level. So, after it was driven to say, 20 or 30 feet, it was tested for yield by a centrifugal pump worked by an oil engine.

The depth to which the filter point is to be driven can be judged from the water table in the draw wells nearby. Discharges ranging from 6,000 gallons to 24,000 gallons, depending on the size of the filter point and underground conditions, were recorded.

There were some failures, mainly due to the sucking in of fine sand and consequent blocking up. Wherever fine sand is met with filter points are a failure. All efforts to counteract this difficulty proved useless after a short period and for this reason, filter points cannot be recommended for places where fine sand is met with in the lower strata.

With experience, however, it was possible to make several improvements. Now, instead of beating it down, a casing pipe is first driven in, using an earth auger to the required depth and the filter point is then put in the bore so made. The casing pipe is removed and the gap filled up with sand. A sand shell is utilised as soon as the sandy layer is reached in the bore.

This way, over 150 filter points were successfully installed in about a dozen villages. Each commanded a minimum area of 10 acres of the second crop of paddy. The maximum was 23 acres. Thus about 2,000 acres were irrigated during the season for the second crop of paddy which produced 30 maunds of paddy per acre. An increased production of 60,000 maunds of extra



The cast iron tip of the filter point

paddy could thus be got by the method during the very first year of its introduction. Besides this there are several advantages like the possibility of starting paddy nurseries for the first crop early and irrigating the garden crops, green manures and vegetables.

More and more farmers are taking to these filter points. This area is now included in the Community Project and they are taking advantage of this successful experiment. This would now enable them to grow a crop in summer. The demand for electric energy for pumping is also on the increase.

The cost of a filter point equipment will be as follows:

	Rs.
Filter Point 4 inches × 6 feet	90
Check valve 4 inches	20
G.I. Pipe line 4 inches × 20 feet at Rs. 5 per foot	100
Other fittings	50
Labour	20
Cost of oil engine and pump set (5 BHP engine & 4 inches pump)	1,700
Contingencies	20
	2,000

(*Continued on page 21*)

A successful filter point in the Godavary Delta

THE SCIENCE THAT WENT BEHIND THE TUNGABHADRA PROJECT

by

W. THIRUMULA RAO, ASSISTANT CHEMIST, ANAKAPALLE

THE four districts of Bellary, Anantapur, Kurnool and Cuddapah in the Deccan zone of the composite Madras State are famous for their constant recurring famines. These districts, because of their situation, feel the influence of the South-West and the North-East monsoons but to a small extent and since both the total and the distribution of rainfall influence crop-growth and yields, this area suffers very badly as a result.

In these districts, the farmer is very ingenious and it is here that the system of farming known as "dry-farming" has been perfected. The farmer, to whose credit are the evolving of famous implements like the "gorru", "guntaka" and the "dantulu", has developed the art of farming to such an extent that with the single pair of animals he is able to cultivate as many as 30 to 40 acres.

IMPORTANT FACTOR

But the economic condition of the people is poor and the tract has the lowest density of population in the State because of frequent famines. But, however, during the not very common occasions when rainfall has been in time and sufficient, the farmers have reaped bumper yields, which only points to the fact that water is the one factor that can bring prosperity to the 1,600 square miles of farmland of this area.

The river Tungabhadra, skirting the districts of Bellary and Kurnool was, therefore, thought of as the natural water source that could change the face of the entire area. This river has a perennial flow and a flood surplus that can be stored. The river has its source in the Mysore State in an area of heavy rainfall and extensive catchment.

Before considering any project for the harnessing of this river for bringing the waters to this area, however, the suitability of the black soils predominating in the area had to be considered, and this cautioned the need for pre-irrigation and post-irrigation soil surveys. As such the Agricultural Department took up, towards the end of November, 1934, a soil survey to determine the suitability of the soils for irrigation.

SOIL SURVEY

The soil survey, extending to the entire area of 1,600 square miles, was for studying the various types of soils in the area, finding out the structure and texture of these soils at different levels so that their permeability and drainage could be known, estimating the occurrence of the soluble salt content, studying the effects of irrigation on the different soil types to know the kind of irrigation that would be most suitable for each of them and finding out possible measures that could be undertaken in case of any harmful effects when brought under irrigation.

The detailed examination undertaken into all these aspects both in the field and the laboratory lasted for more than a year. Side-by-side, a detailed agricultural enquiry was also conducted at representative centres, and information on crop rotations, tillage practices and manuring systems in vogue was collected.

The soil survey showed that 80 per cent of the soils were black with high lime status and good base exchange capacity, while the rest were composed of red soils—deep, shallow and mixed. The presence of gypsum indicated the existence of a high zone of salt concentration, mostly occurring at a depth of three feet. Permeability in clay soils is low, but the gypsum present improves permeability and percolation. Harmful salts of the carbonate type were absent in the soil. Soluble salts in irrigation water play a very important part in effecting soil characteristics. So far, however, the Tungabhadra water has not produced any harmful changes in the black soils though instances have occurred of water from other sources producing unfavourable soil change, leading to formation of sodium clay.

PROTECTIVE IRRIGATION

All possible evidence, therefore, pointed out to all success in irrigating black soils. The Government, therefore, recommended that proper drainage be provided as an adjunct to the distribution of the water to areas and that the drainage channels so aligned that the drainage water may not find its way into the supply channels. It also recommended a light irrigation of dry crops as a sort of protective irrigation as this would obviate indiscriminate use of water and benefit a greater area.

As a forerunner to the inauguration of the Project, research to find out solutions to agronomic problems in field practices was also undertaken and a research station opened at Siruguppa in 1937. Here, a study of physico-

chemical reactions of the typical black soils, both deep and shallow and of gypseous and non-gypseous nature was undertaken. At the Research Station, studies on duty of water, rotation of crops, soil management, types of crops suitable for cultivation, and introduction of new crops were undertaken. Seven years of intensive work at the Station confirmed the earlier findings that the area was suitable for irrigated farming.

All scientific evidence thus assuring success for the Project, the Tungabhadra Project was started in February, 1945. The construction of the dam is just completed and the digging of different canals is being finalised. The dam is 6,007 feet long and 160 feet high and is built at Mallapuram, a few miles up the river Tungabhadra near Hospet. The Project consists of the low level canal and the high level canal stages and is a combined power and irrigation scheme. The low level canal, just completed, has begun to irrigate the farmlands.

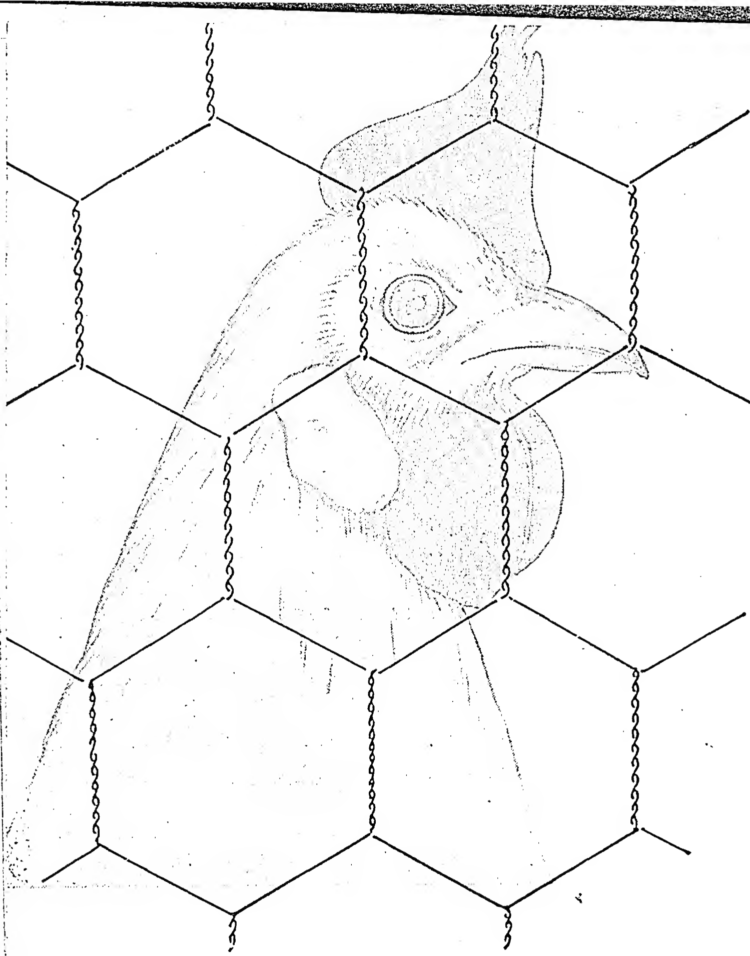
PROJECT COMPLETED

The main low level canal is about 200 miles in length and runs on a ridge from the places where the dam is built in Bellary district to Kurnool district. The water is shared by Andhra, Mysore and Hyderabad States. The Project is intended for protective irrigation and can be termed "dry irrigation", being used for raising the dry crops usually grown in the tract. The amount of water is restricted to a total of eight irrigations of two inches each and given at fortnightly intervals. Only one crop, either in *mungari* (early season) or the *hingari* (late season) can be raised in the dry-cum-wet zone. When this low level system is developed it will irrigate 2,50,000 acres on the Madras side, comprising a perennial zone of 15,000 acres of wet land crops like paddy and sugarcane, a wet zone of 43,000 acres for raising a single crop of paddy and a dry-cum-wet zone of 1,92,000 acres where only one dry crop can be grown. Adequate provision can be made for irrigations when rains fail.

Of the total area, half is to be put under food crops and the other half under cotton and groundnut.

The Tungabhadra Project has brought a new hope to the farmlands so far accustomed to the vagaries of nature. The Project is such as to facilitate still further expansion. It is quite possible that some day in the near future a still larger area is brought under assured water supply. The Project is surely a case that gladdens the hearts of the band of workers who took up this pioneer type of detailed scientific investigation which led to the transformation of the famine-zone into a veritable granary for the people.

A view of the Tungabhadra Dam



FOR YOUR POULTRY FARM

START WITH A PLANNED LAY-OUT

by

S. G. Iyer

IT is a very wise policy to have a proper plan regarding the scale of operations that you wish to build up in the poultry farm you are intending to start. It is always best to start off in a modest way and build up solely from the stock you yourself finally are able to select. However, it is necessary to have a definite idea of the eventual lay-out so that the farm can be properly designed and conveniently worked. I have seen the lay-out on many farms and have found that these farms grew up haphazardly, involving unnecessarily large capital investment and extra labour charges.

Having decided on the breeds you want to maintain, the next question to decide is with what you will start your basic stock. Personally, I would advise starting with hatching eggs as this is probably the cheapest method and incidentally the safest. The beginner should start off with the best possible stock, and if possible, see the parent stock. Ensuring that the vendor is dependable is also important.

In buying eggs for hatching, see that they are good-sized, clean and good-shelled and fresh. This can be judged by the size of the air cell and the appearance of the yolk. Make sure that the eggs are not more than seven days old.

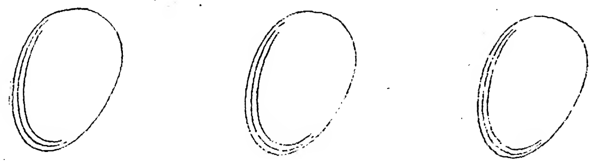
If you are thinking of starting with grown-up birds, it will be best to buy those which have been trap-nested for a year with males who come from females having good records. If possible, see some of the eggs produced by the female.

You can also make a start with pullets but this may turn out to be, as often happens, an expensive way of starting a farm.

If stock is to be purchased, it is better to do so from a nearby source because birds easily pick up diseases if they have to travel over long distances. The journey itself may make the birds go into moulting. If birds are obtained from different sources, keep each lot isolated for ten days so that you can detect the appearance of any disease in any group and localise the same. Feed on the sparing side till the birds get used to their new feeds.

If the farm is going to be primarily a breeding farm, the most expensive part will be putting up fences to keep the different stocks apart. As a general rule, the pen should be, as far as possible, a square as such a shape provides the maximum of space per unit of fencing. Runs should be six feet high.

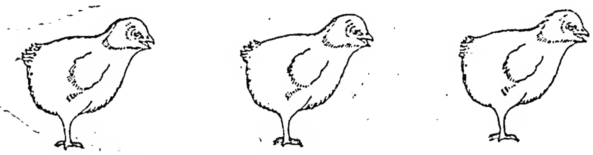
The incubator room and the brooder house for the birds should be close to your dwelling house as these are the places you will have to visit quite frequently.



Provide 20 square yards of space for an adult bird and atleast 10 square yards for a young bird. The brooder house should be drought proof, airy and able to provide protection from wild animals and birds. Normally, if there is no danger from predatory animals, it should be possible to get the chickens out from the brooder house when they are quite young, but usually because of the danger from such a source, the chickens are put out only after they are eight weeks of age.

The beginner is well advised to aim always at quality than number. Hence, defective birds should be killed or sold off for table at the earliest opportunity. Similarly, deformed chickens or ailing birds should be eliminated.

One common mistake poultry-farmers usually commit is the overcrowding of birds. This has to be avoided. At the beginning of the season it is advisable to work out a hatching programme which will give enough time to clean out each brooder compartment before it is stocked again. The hatching programme should not be such as to entail overcrowding in any class of stock.



The number of chickens that can be put in a brooder depends on the size of the brooder and the compartment. Roughly, a square foot of the area can accommodate 20 to 25 chickens.

As far as possible, make it a point to purchase atleast a new male of each breed every year to replace the old one. Though this bird will give a number of males in the next season, it is always good to bring in a fresh male breed for the following season.

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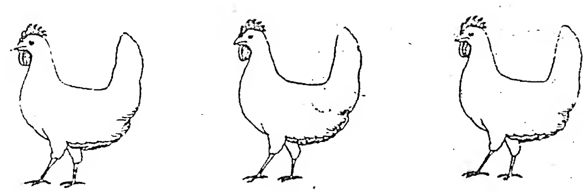

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If electric energy is available, the cost will be only Rs. 1,700 because of the difference in cost between a 5 BHP oil engine and 7.5 BHP electric motor.

The cost of irrigation is the cheapest when water supply is available from any project. It is only the cost of water cess, which usually ranges from Rs. 12 to 20 per acre in the Godavari Delta. The cost of lift irrigation by a filter point tube well or from a well or pond is the same. The cost of working the engine and the depreciation have to be taken in working out the cost. The above equipment on an average can command 10 acres of the second crop of paddy. The cost of depreciation can be safely taken as 10 per cent. Therefore, the cost of irrigating an acre by a filter point tube well is roughly as follows:

	Rs.
Cost of fuel oil for four months (working at eight hours per day)	400
Cost of lubricating oil	30
Small repairs and maintenance	20
Driver boy at Rs. 40 a month	160
Depreciation at 10 per cent	200
Contingencies	40
Total for four months	850

Since this cost is for 10 acres, irrigating an acre for four months will work out to Rs. 85.

Usually, this outfit can manage 12 to 15 acres, and last for over 15 years. Thus the cost will work out still lower taking this into consideration. Even with this heavy cost accounting, it is certainly a paying proposition, with the additional advantages of perfectly easy fixing and working. Filter points will obviate the costly, laborious and uncertain process of well-sinking.

THIS WAY TO MANAGE YOUR GOAT FLOCKS

by

H. K. Lal

GOAT-breeding has to be done on systematic lines if the flock-owner has to get the best benefits from the animals he maintains. It must be remembered that good feeding and housing alone will not bring about improvements in the flock unless attention is paid to proper breeding.

One good, strong and pure male, three or more years old, can serve from 50 to 150 females a year, provided he is always maintained in a healthy condition. Though a buck is capable of service at eight to nine months, he should not be allowed to mate till he is 15 to 18 months old nor should he serve more than about 30 females a year before he is three 3 years old because he would not be fully matured till then. When the buck is quite young, it is good to allow an interval of about two weeks between services. Later the interval can be reduced to two or three days.

CARE OF THE MALE

The male should always be kept separate from the females. This will prevent his becoming unduly restive or excited and will enable him to serve a larger number of females during the year. When a female comes into heat, she should be brought to the male and removed after she has been served once or twice.

If the buck is well kept and properly looked after, he may be useful for breeding for as long as even 12 years.

Proper grooming, where possible, is necessary to maintain the animals in good health. Clipping superfluous hair every three months in the bucks keeps them clean.

Kids take just about five months to be born after the female has been mated, and as such it may be possible to breed her as often as twice a year and though she may come into heat a month or two after she has given birth, it is not advisable to mate her again at that time as it would mean an unn:cessary strain on her. Precautions should be taken to prevent her from being run down.

SEPARATE STALL

A female goat should be kept in a separate stall or compartment for about a week before the time she is "due", to avoid the danger of her being injured by other goats. When signs of approaching parturition are noticed, she should not be taken out to graze but kept in a comfortable goat-pen. She should be kept in the special compartment for about three to four days after kidding, after which she may be allowed to go out for grazing with others. At the time of kidding, the goat is best left to herself, as she rarely requires any assistance. Newly born kids on gaining their legs, make for the mother's teats. If they do not succeed in doing so or are slow at it, it is of no consequence, as kids do not require nourishment for a number of hours after birth.

MILK FOR THE KIDS

If two, three or more kids are born, it may be necessary to see that the smallest one gets sufficient milk as generally the stronger ones do not give it a chance to the teats fully.

In case the udder is too full with milk, the weight and pressure of the same will cause pain to the

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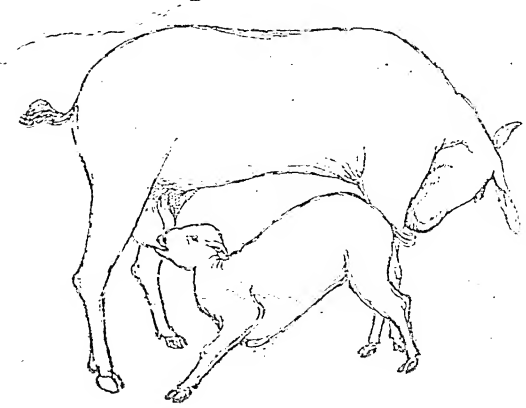


The Farm Home

THE WHEN AND HOW OF WEANING THE CHILD

The question that young mothers mostly ask

MOST young expectant mothers are interested to know some details regarding the nursing of the baby. The question they ask is how does nature's method of feeding the child compare with artificial or bottle feeding? How long should a mother with sufficient of milk nurse her infant ?

Today, we have a lot of scientific informtion to help us. We know a good deal about what milk contains and what sanitary principles to follow so far as milk is concerned. In the days of our grandmothers, all this was unknown and the infant's survival depended a great deal on whether or not he was nursed on mother's milk.

NO DIGESTIVE TROUBLES

The very small, premature baby or the infant who has a poor digestion does better on its mother's milk than artificial feeding because the mother's milk is nature's most perfect food for the baby. Even for the strong and sturdy baby who has had his full term shows greater freedom from minor digestive troubles on the mother's milk than when bottle-fed.

Apart from this, nursing a baby makes it feel warm, cozy and loved and it finds this form of getting nourishment very pleasant.

Instances occur, however, when the mother's milk is found unsuitable for feeding either because it is too rich and heavy or too watery or poor in quality. Then, of course, the necessity for a formula preparation arises.

In bottle feeding, the mother should always make it a point to hold the infant in her arms so that it may feel a sense of closeness and security. Bottle feeding has disadvantages too but this need not unduly worry the mother.

A gradual breaking of baby's habit from mother's milk to that of bottle milk so that eventually it gets all its feed from the bottle is called weaning.

Weaning is resorted to when the mother is extremely ill or her milk does not agree with the baby. It is also done when the mother cannot produce enough of milk or does not like the thought of nursing her baby. In many of these cases, weaning may have to be done rather fast so that baby and mother do not suffer in any way. Then the doctor is best consulted.

STRAIN ON MOTHER

No definite answer can be given to the question how long should a baby be nursed. Probably, eight to nine months is good, provided there is enough milk. It is not uncommon for poor working mothers to nurse their children till they are even two years old. Probably, this is because the mothers cannot afford to buy milk for them. However, this is a great strain on the mother and soon tells upon her health.

If conditions are normal, weaning must be done gradually so as not to upset and irritate the baby. It is good that the baby gets accustomed to a bottle a day from the early months so that at six or seven months it may take the bottle with ease.

The baby's satisfaction after each feeding and his rate of weight-gaining generally indicate the time to start weaning. The mother will also know when her milk supply gets diminished so that she may start weaning the child.

The best way to start weaning, according to medical opinion, is by omitting one breast feeding at a time and allowing two or three days to pass before omitting another. The breast feedings that are omitted should be reasonably spaced. This will help the mother to get used to the lessened demand on her milk.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

LET NOT PESTS BOTHER YOUR VEGETABLES

Telling you how best to tackle the destructive little things in your garden

Cockchafers, beetles, borers, aphids, bugs, ants and termites—this is the big list of pests that thrive on a vegetable plot, consuming, of course, a good part of the farmer's income.

Farmers are familiar with the kind of damage they do—to the roots, foliage, buds, flowers and even fruits.

No one control measure can save the crop from all these pests, because the measures have to depend upon the nature of the pest and its mode of feeding. Some can be killed by spraying with stomach poisons, some have to be sprayed with contact poisons, and yet others require fumigation to exterminate them.

COCKCHAFER

The cockchafer is a voracious eater of the roots, foliage and flowers of tender vegetable plants. The grub-cockchafer has a large bloated body and ultimately transforms into a beetle, brownish in colour.

The insects are active at night feeding on leaves, flowers and even fruits of vegetable plants and can be caught with the help of light traps. Such traps can be set up by placing a kerosene oil or gas lamp in the middle of a trough filled with water. A little kerosene oil is poured over the surface of the water. The trap is placed in the middle of the field. More than one trap may be necessary for large fields. The insects, attracted by the light fall into the kerosene-mixed water below, and are killed.

In case the attack is too heavy, a spraying of lead arsenate affords a sure remedy.

BEETLES

The beetles attacking the vegetable crops are the red pumpkin beetle, the black pumpkin beetle, epilachna beetle, which damage brinjals and cucurbits and the rhinoceros beetle which bores into the slender stems, leaves and other portions of the plants.

Light traps and lead arsenate may be used to control beetles. Some of them can also be killed by filling the holes bored by them with *neem* oil.

BORERS

Caterpillar borers can be killed by punching them with a piece of wire or filling the holes bored by them with *neem* oil. Beetle borers may be exterminated by plugging the holes bored by them with cotton wool dipped in a mixture of two parts of chloroform to one part of creosote, and sealing the mouth of the hole with beeswax.

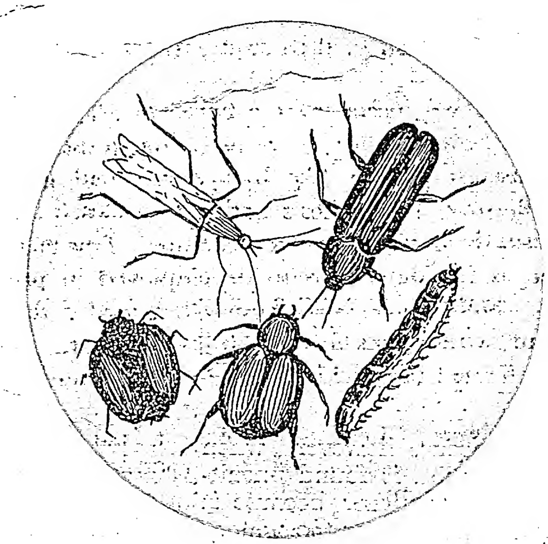
APHIDS OR PLANT LICE

These are small soft-bodied insects, usually green, deep purple or black in colour and are commonly seen in colonies on peas, cabbage, radish, etc. They attack tender parts of the plants like the shoots, tender foliage, buds, flowers, etc., and suck the sap which hampers growth of the plants culminating in the complete drying up of the affected part or the whole plant.

Tobacco decoction, fish oil rosin soap and sometimes even a mere soap solution in water are used to get rid of plant lice.

MEALY OR WOOLY BUGS

These too collect on the plants in compact colonies depositing on them egg-masses of cotton-like fluffy



material. Repeated applications of an oil insecticide such as fish oil rosin soap may be necessary to control them.

ANTS

These not only encourage infestations by insects such as bugs, scales and aphids, but also are a nuisance by themselves. They bite and injure tender stems of the plants and seedlings in the nursery beds. To repel them from the seed-beds, the beds should be freely watered with a solution of four ounces of kerosene oil to four gallons of warm tobacco decoction.

WHITE ANTS

These are one of the most dreadful pests of garden crops. A good quantity of sand put all round the plant stems helps keep them off for some time. White ants can also be kept at a distance from the plants by smearing the basal portion of the plants which is in contact with the soil, with lime sulphur solution. Fumigation of ant hills with sulphur and arsenic fumes also kills the insects.

INSECTICIDES

Insecticides are usually classified under three heads: (a) stomach poisons, (b) contact poisons and (c) gaseous poisons.

Stomach poisons are used for destroying the insects like beetles, grasshoppers, grubs, caterpillars, leaf-rollers, etc., which chew and tear off bits from the plants.

Sucking insects such as bugs, aphids, etc., cannot be killed by spraying stomach poisons on the plants as the poison is not taken in by them. So, contact poisons, which block the respiratory pores of the insects, suffocating them to death, or which bring them death by causing irritation to their body are used.

Some sucking insects have a hard covering on their bodies. So, contact poisons are not of much use in their case. Gaseous poisons like hydrocynic acid gas are used to destroy them by fumigation in a closed atmosphere, usually a small tent-like structure. This method, however, is too dangerous to be employed in private gardens. Soil fumigants are now-a-days used to destroy white ants, wire-worms and eel-worms in the soil. Some of the well-tried insecticides are described below:

Lead arsenate : Lead arsenate is a safe, effective stomach poison, used against chewing insects such as beetles and caterpillars. Two pounds of the powder thoroughly mixed with 100 gallons of water would be suited for normal conditions. Its efficacy may be increased by adding molasses and lime at the rate of three pounds of lime and six pounds of molasses for every pound of the mixture.

Fish oil rosin soap : It is a ready-made dark brown semi-solid substance which is dissolved in cold water before use. The usual proportion is one pound of soap to eight gallons of water. This solution is sprayed to control the sucking insects like lice, mealy and wooly bugs, etc. Repeated sprayings may be necessary in some cases.

Soap solution : A solution of one pound of any bar soap in six gallons of water acts as a cheap contact poison.

Tobacco decoction : Tobacco and its products are some of the best known insecticides. There are several nicotine preparations such as nicotinic acid and nicotine sulphate which are available in the market, but the following can be prepared easily: boil a pound of tobacco leaves in a gallon of water for about half an hour or steep in cold water for a day or two. In this decoction dissolve about four ounces of any bar soap. When cool, dilute up to five to six times with water and use for spraying the infected plants.

Besides the above preparations, several proprietary products like 'Gammexane' and some brands of D.D.T. available in the market can also be used with good results.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

—*Editor*

(*Continued from page* 22)

female. A portion of it, therefore, should be drawn away. As soon as the milk comes out freely, the kid should be put to the mother. If they are unable to draw the milk properly, the teats should be placed in their mouths. Once they have drawn in a few drops, they rapidly take to the teats and will not require help the second time.

COLOSTRUM IS GOOD

The milk that comes out of the udder for the first three days has a yellow appearance. Such milk is called colostrum. This must be fed to the kids because it acts as a laxative and confirms immunity against diseases from which goats usually suffer.

When kids are about two weeks old they begin taking interest in nibbling green or dry fodder and it is good to see that they easily get small quantities of these.

Kids should get the maximum opportunity to be in the open air and sunlight. In the hot weather it will be well to put them inside an enclosure round a tree. Here they will have the benefit of shade, light and air. The enclosure should be big enough to provide for sufficient space for them to have plenty of exercise.

When kids are about 2½ to 3 months old, milk may be dispensed with and when four months old, they should be in a position to eat the solid food the older kids eat.

CASTRATE THE KIDS

Male kids should be castrated at the age of 2½ and 3 months, unless required for breeding. Incidentally, castration also improves the quality of meat. If they are not castrated, male and female kids should not be allowed to graze together. In selecting animals for breeding, not only the health but also the ancestry of the individuals should be considered because on the latter depends the yielding capacity of the progeny. The value of the male is judged by comparing the yield of the progeny with that of the female with which it is mated. As such a flock-owner must maintain correct milk records by which he will be in a position to assess the individual worth of his breeding stock.

(*Continued from page 11*)

aspects of village work or it may be that he is reluctant to allow others to share his duties. There is always a likelihood in the villages of some people getting jealous of the personal attention given to the local leaders. The extension worker has to guard against this.

It is likely that in some villages the people get themselves divided into opposing sections because of the conflicting opinions or differences their respective leaders may have against each other. The village worker has to be careful in dealing with such leaders and will have to use all his tactics to see that he does not get himself involved in these differences.

—*From the forthcoming publication, "Extension Guide for the Village Worker"*

(*Continued from page 15*)

obtained and this is maintained by adequate manuring and hoeing.

Seed is best raised during the spring season. The crop is allowed to grow and flower after taking a cutting of green fodder in January-February. To encourage profuse flowering, water is sparingly applied and withheld altogether at the time of ripening. Usually two to three maunds of seed per acre is expected but under favourable conditions as high a yield as eight maunds per acre has been obtained at Sirsa.

Small Millets
FOR
The Mysore Farmer

by

B. VENKOBA RAO, ECONOMIC BOTANIST TO GOVERNMENT OF MYSORE

AS a result of research carried out for a period of eight years, new high-yielding strains of the smaller millets are available now for sowing to Mysore farmers.

Though the small millets, *same* (*Panicum miliare* lam), *baragu* (*Panicum miliaccum* Linn) and *oodalu* (*Echinochloa frumantacea* Link) occupy a relatively small area in the State, and are of local importance in the central, northern and eastern areas of Mysore and particularly in the areas bordering the States of Madras and Bombay, because of their quick-maturing habit, they assume greater importance in seasons of distress when sowing rains are delayed or fail altogether.

The work of evolving superior, high-yielding and drought-resistant strains was undertaken by the State Department of Agriculture under a scheme sponsored by the Indian Council of Agricultural Research in 1944.

Small quantities of the new high-yielding strains are being made available now for trial in farmers' fields. The following are the details of the new-bred strains :

SAME STRAINS

Two distinct types of *same* (*sawa*) are grown in Mysore. One is a short, early type, known as *same* and the other is a taller, vigorous late type, called *hejjave*. Of the early type, 35 local races were tried, and *Same* 1, a local race from Sira, proved to be the heaviest yielder, giving 300 to 500 lb. per acre of grain, depending upon the season. On an average, this has produced 12 per cent more grain than the local varieties. *Same* 2, a race from Belur was a close second. Both these have proved to be superior to varieties obtained from outside. Two high-yielding races of *hejjave*, *Hejjave* 1 and *Hejjave* 2 have been isolated. These local races give about 240 to 250 lb. per acre of grain and also turn out adequate quantities of fodder. Exotic varieties tried were found equal to local in yield of grain but suffered from the handicap of a smaller grain-size. In trials conducted so far, these have on an average produced an increase of 23 per cent more grain over the local standard.

BARAGU VARIETIES

Local races of *baragu* (*vari*) under trial amounted to 25, apart from six improved varieties obtained from outside. Among the exotics, No. 82 of Coimbatore was found to be the best, and nearly on a par with *Baragu* 2. *Baragu* 1 isolated from local *madhugiri* is white-seeded, yields on an average 225 lb. per acre which represents an increase of 25 per cent over the local. The Chintamani type *Baragu* 2 is black-seeded, more hardy and drought-resistant than the former with an average yield of 215 lb. per acre.

Oodalu (*banti*) occupies an insignificant area in the State from where only two races could be obtained. These were compared with 12 other varieties from outside. The local races proved to be definitely poor in these trials. Poona 97 proved to be the best with an average yield of 273 lb. per acre. This variety also produces appreciable quantities of forage. A local selection named *Oodalu* 2, while slightly lower in yield than Poona 97, was observed to be more drought-resistant.

While further work on these small millets is being continued as a part of the Departmental work, the above improved strains are being popularised.

TWO CATCH CROPS FOR MADHYA BHARAT

by S. M. Wakankar

Two pulse strains recently evolved have been found highly suitable for growing during the *kharif* season in fields normally sown with *rabi* grains in Madhya Bharat. They are *mung* Krishna-11 and *urid* Ujjain-4. The two strains were evolved under a co-ordinated pulse improvement scheme jointly financed by the Indian Council of Agricultural Research and the Madhya Bharat Government.

The growing of these two strains of leguminous catch crops will not only help in enriching the soil, but also increase the output of protein-rich food which our country is in very much need of. The introduction of these two crops will not encroach upon the area of *rabi* cereals, particularly wheat.

Mung Krishna-11 is an early-maturing strain of *mung* (*Phaseolus aureus*) selected from material obtained from Madras State. The crop is not, however, uniform in maturity. The first picking is ready within 65 days of sowing as compared to 110 days required by the local varieties to mature. It is suitable for double cropping in fields where wheat is normally grown.

The crop should be sown with the rains in the beginning of July. By the middle of September the pods can be gathered when they mature and later the crop can be ploughed in as a green manure. If the full benefit of the harvest is desired, a second picking is necessary.

When the green manure crop of *mung* has completely decomposed, the field should be prepared in the normal way for sowing wheat in the last week of October or latest by the middle of November.

Early urid — *Ujjain 4*

Early mung—Krishna 11

The *mung* crop is ideal for lands where irrigated wheat is grown but it is necessary that the lands are well-drained. The normal operations and manuring for wheat should be done when a normal wheat yield can be obtained. Phosphatic manuring of the fields can be done to advantage before sowing the *mung* crop. This crop can also be utilised as green forage if required. The normal seed-rate for *mung* is 10 pounds per acre when grown for seed and 40 pounds when grown solely for green manuring, but this seed-rate can be reduced considerably. The seeds of *mung* Krishna-11 are fairly bold. Other details are as follows:

Colour of seed	Light green
Number of grains per chhatak	1,675
Protein content	24.6 per cent
Average yield	250 pounds per acre
Percentage increase over local	12 per cent

Mung Krishna-11 is suitable for growing in the districts of Bhind, Gird and Morena in Northern Madhya Bharat.

URID UJJAIN-4

This strain of *urid* (*Phaseolus mungo*) has been evolved for the Malwa tract of Southern Madhya Bharat. It is an early-maturing strain which takes 90 days to mature as compared to 120 days taken by the local varieties. The crop ripens uniformly. It is suitable for sowing on lands where wheat is normally grown. In case the season is normal and normal rains are obtained in the month of September, a second crop of *barani* (un-irrigated) wheat can safely be taken from the field on which *urid* Ujjain-4 had been grown. Similarly, normal yields of gram can also be obtained.

This *urid* strain is sown with the rains in the beginning of July and the crop is ready for harvest by the last week of September or the first week of October. After the harvest, the field should be harrowed across twice by *bakkhar* (blade harrow) and wheat or gram can be sown in the second or the third week of October. The seed-rate for *urid* is 10 pounds per acre. Seeds of *urid* Ujjain-4 are bold. Other details of this strain are given below :

Colour of seed	Dull black
Number of grains per chhatak	1,310
Protein content	23.1 per cent
Average yield	400 pounds per acre
Percentage increase over local	40 per cent

With the help of these two strains of pulses two crops can be grown where one grew before.

(*Continued from page 13*)

Wherever afforestation measures have been undertaken, there has been a bumper crop of grass, which is harvested and stored for use in the lean months. Cattle in such areas will naturally be better in condition as they will have better and more fodder.

The cure for soil erosion is the restoration of vegetation so as to protect the soil from the erosive action of wind and water. This can be secured by the afforestation of the high lands and the proper and sustained management of State and village forests by limitation of flocks to a number the vegetation can actually support. These have to be supplemented by taking recourse to stall-feeding and proper pasture management.

Better agricultural practices along with terracing, levelling and contour bunding will prevent loss of top soil by sheet erosion and conserve rain water.

Soil conservation is the crying need of today on the eroded lands so plentiful in Hyderabad State and other parts of the Deccan. Poor land means poor farmers, poor trade, poor Government.

(*Continued from page 21*)

A good alternative would be to purchase some good eggs each year, and when the pullets hatching out of these are grown-up, trap-nest them and mate them to a male from your own stock in the second year. This ensures that the females breeds the right number and size of eggs and that the male is a selected one because it comes from your own stock. Buying all your old replacement stock each year is expensive and is not a proper way of running your farm because then the stock you purchase will be of an unknown value.

(*Continued from page 6*)

I was not a little surprised when I was told that the present farm comprising more than 30 acres was the result of Sardar Basant Singh's own efforts. He had inherited only five to six acres of land from his father and by making economic use of the income obtained from these acres, ploughing it back into the farm, had increased the size of the farm to what it is today. People around the village hold the Sardar in great esteem and depend on him for advice in better methods of cultivation.

WHAT'S NEW IN FARMING

RICE AND AMMONIUM SULPHATE

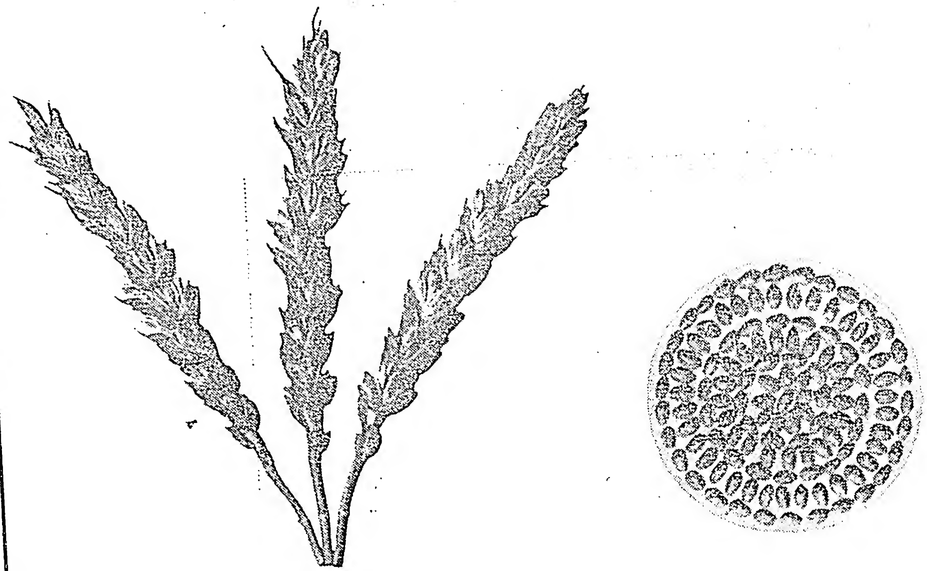
EXPERIMENTS carried out to determine how the yield of paddy can be increased by the application of nitrogenous fertilizers in the Punjab showed that the yield of paddy increased with increase in the dose of nitrogen given in the form of ammonium sulphate. However, it was found that the increase was not proportionate beyond a dose of 40 lb. of nitrogen per acre. Doses higher than 40 lb. of nitrogen per acre were found not economical. The experiments were carried out with two varieties of rice, 349 *Jhona* and 370 *Basmati*.

MONSOON FALLOWS

Farmers sometime believe that keeping land fallow during the monsoon improves the fertility of the soil. While this may be true to a certain extent, it is equally true that in heavy rains a lot of good soil is washed away if the land is kept fallow. It is, therefore, desirable that the land is cropped during the monsoon in such a manner that the soil improves. In Uttar Pradesh, where a large area is kept fallow during the monsoon, quick-maturing legumes like *Moong* T. 1. and *Lobia* T. 1. have opened out new possibilities. Such crops not only cover the land during the monsoon but being leguminous crops also add nitrogen to the soil. Again, they also yield a certain amount of grain which the farmer badly needs at that time. Other leguminous crops that can similarly be used are *sanai*, *dhaincha* and *jowar*.

HARROWING WHEAT AND BARLEY

It has been found in Uttar Pradesh that a light harrowing of wheat and barley fields after the first irrigation when the crop is not more than eight inches high has given very encouraging results. Yields, as a result, increased by about 10 per cent. Harrowing done with a light peg-tooth harrow after irrigation, depending on the nature of the soil, not only helps to aerate the soil better and preserve moisture in the soil for a long time because of the fine mulch produced on the surface of the soil, but also encourages tillering. It is estimated that if farmers were to adopt this practice in Uttar Pradesh alone, which grows about 6½ million acres of wheat and barley under irrigation annually, the State will have two lakh tons more of these cereals. The harrow used for this purpose consists of a wooden frame with iron pegs six inches long and can be made by the village carpenter and blacksmith at a nominal cost.



N.P. 809, the new variety evolved

RUST — RESISTANT WHEAT

Recently, a new variety of wheat, resistant to all the three types of rusts, viz. black, brown and yellow, and loose-smut diseases has been evolved at the Indian Agricultural Research Institute, New Delhi. Christened N.P. 809, this new variety is adapted to a wide range of agronomic and climatic conditions prevailing in the low and high elevation areas of the Uttar Pradesh and Himachal Pradesh hills.

N.P. 809 is a tall, stiff-strawed, late-ripening, beardless variety of hill wheat and is sown from early October to the middle of November. It requires an average to rich soil for its cultivation. The yield is high and the grains white, medium-sized and of good quality with an attractive appearance.

Indian Farming

VOL. IV **AUGUST 1954** **No. 5**

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EDITORIAL BOARD

SUBSCRIPTION RATES

Annas 12 per copy   Rs. 9 for 12 issues   Rs. 4-8 for 6 issues

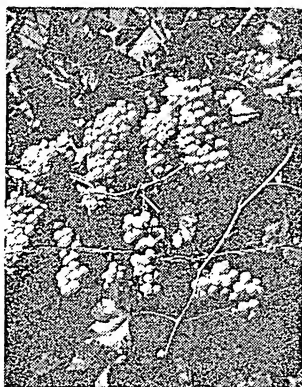
ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

Editor's Page

FARMERS' ORGANISATIONS

THERE are no two opinions regarding the fact that any plan designed to increase agricultural production cannot succeed without an active co-operation from the man behind the plough. Governmental activity in this regard, however efficient it may be, cannot yield the desired results unless farmers fully associate themselves with the formulation as well as the execution of the plans. So far, the farmer has always strayed into the background for various reasons and has depended on others to speak on his behalf. In this process, the farmer has never received full opportunities to express his own views on matters that vitally concern him nor has he been able to take an effective part in shaping the future of the farm and the community. The National Development Plan has given the much needed incentive to the farmer to come forward to help himself as well as be helped. The meeting of representative farmers in Srinagar last month marks another chapter in the country's attempts to put the farmer on his own. How much important the formation of an organisation is to the farmers was expressed by Dr. Panjabrao Deshmukh, Union Minister for Agriculture, when he told them, "In every vocation, people having common problems and aspirations have their own organisations or councils through which they speak with one voice and, therefore, with considerable force, on questions concerning their welfare. Because of their strength and influence they command, they are in a position to secure many of their demands. That the farmer should not have learnt from these only proves the utterly helpless condition in which he finds himself today and this is so in spite of the fact that agriculture is the major industry in the country." Such an organisation, he said, could work with a common desire to provide a greater security to farming and ensuring a greater prosperity to farmers. What functions such an organisation should do has been left to the farmers themselves to discuss and decide. A bare outline of what can be done has been indicated at the Conference. Farmers have many vital problems for which they have not been able to find adequate answers. The fixation of prices of agricultural produce, the establishment of efficient marketing machinery, development of farmers' co-operatives and provision of adequate rural finance are some of the problems that have been suggested for the farmers' organisations to think about. The idea of establishing a farmers' bank to provide working capital for financing the various activities of the farmers has also been suggested. Farmers' organisations, when established at various levels, can, apart from tackling these broader issues, effectively function by undertaking a critical review of methods of cultivation practised by their members, take steps to encourage the attainment of a higher standard of efficiency in farming, promote a healthy spirit of competition and a higher standard of living. Through these organisations, the producer can have a forum in which agricultural opinion can be crystallised and forged into a well-written pattern of agricultural industry. Other issues that have been looming large in the rural horizon in recent years such as fuller employment, better wages and living conditions in the rural areas can also be efficiently tackled. It is hoped that soon there will be not only one organisation of farmers but a network of them in the country as are found in many parts of the world, working for the common good of all and safeguarding the interest of farmers for the ultimate benefit of the country.

OUR COVER



These beautiful grapes were grown by Shri G. G. Shembhekar, a farmer of Baramati in Poona district of Bombay State. The farmer not only grew grapes successfully in an area considered generally unsuitable for the crop, but also has been getting bumper yields since about 30 years.

HE MUST HAVE ONLY THE BEST

WHETHER he practises medicine or does farming, Sardar Amrik Singh, whom I met about two months ago, must have only the best. A qualified L.S.M.F. doctor, Sardar Amrik Singh took to farming about three years ago after resigning his lucrative post of doctor-incharge of a Government hospital, and is now raising bumper crops at Paddi Jagir, his native village in tehsil Phillaur of Jullundur district in the Punjab.

In fact, he is considered to be one of the best sugarcane growers of this tract. He produced the highest acre-yield of 1,504 maunds as against the average of 652.85 maunds in the area in 1953-54. On my asking him, he told me that he had used 20 maunds of groundnut cake in addition to 500 maunds of farmyard manure per acre to raise such a huge crop. He had also applied three maunds of ammonium sulphate to his field in two doses, with the second and fourth irrigations.

Dr. Amrik Singh is also a very successful wheat grower. He won the third prize of Rs. 50 in the crop competitions held at the tehsil level in 1952-53. The yield obtained by him was 51 md. 15 sr. per acre, the average of the area being 15 maunds only. Besides, he also grows improved varieties of cotton, rice, garlic, etc.

The one thing that struck me was the novel method in which he controls the pest-attacks on his sugarcane and cotton crops. He has reared 30 guinea fowls which, he told me, are very economical as compared to the labour hired for picking the insects like *toka* of cotton and the top-shoot borer or *safed keeri* of sugarcane. These " unpaid " workers of the Doctor engage themselves in this work from dawn to dusk, and no supervision is needed.

As we stood near the field watching the fowls, I was amused to see one of them jump many feet high in the air to catch a hopper ; and it did not miss the mark.

It is always interesting to meet farmers like Dr. Amrik Singh who adopt novel methods to tackle their difficulties.

—H. K. S.

Farmer's experiment leads to top yield

by
M. A. Hamid

Shri Sankaranarayana Thevar

The crop that brought Thevar fame

PARAIKULAM, a hamlet with 40 houses and 200 people, has achieved sudden fame. That fame was earned for it by its 32-year old inhabitant, Sankaranarayana Thevar, who is a new kind of hero. Thevar won prize after prize for the highest crop yields, first in the Firka and Taluk competitions of 1951-52 and later in 1952-53 in the district, regional and State competitions. The State of Madras has since given him the title "Uzhawa Manikkam" or gem among farmers. He has already produced on the soil of Paraikulam as much as 11,255 lb. of paddy per acre, and is at present making every endeavour to better that yield.

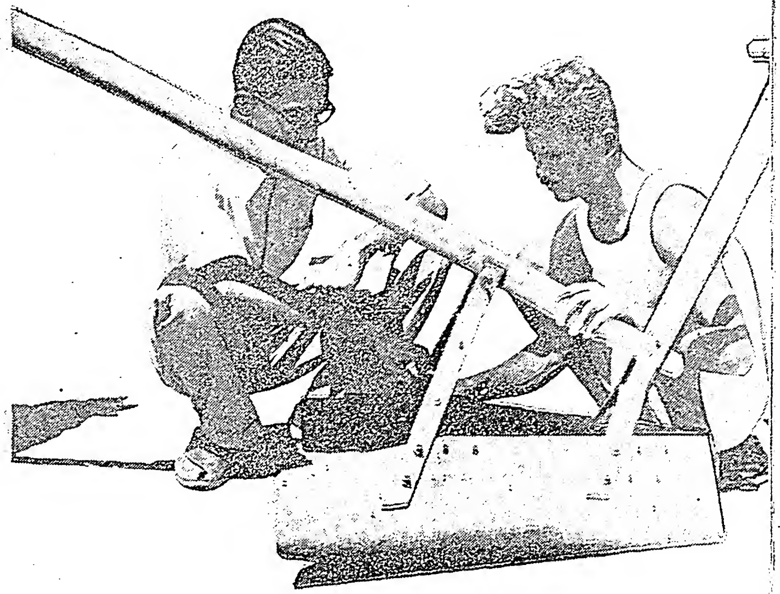
Any one who has gone to Paraikulam, that remote little village in Ramnad district, would realise that nothing but perseverance could lead to such results in that spot of earth. The hamlet has a tell-tale name;

Paraikulam, in Tamil, means the rocky tank, and true enough, in recent years the tanks in the vicinity have contained all rock and no water. One could easily notice in the scene the effect of the long drought, particularly the absence of trees and other vegetation as far as the eye could see; and in the hamlet itself one could see only a few cattle and fewer poultry. Aridity had all but devastated the region and rains came in sufficient quantity only this year.

Thevar had struggled through many such lean years with courage. Typical scion of a community well-known for its dogged perseverance, this peasant had utilised the years of struggle as years of experimenting and learning. With just seven acres of wet land to grow paddy on and without any modern equipment or adequate cattle or cash for purchasing such resources, and above all gambling on the whim of the weather God, Thevar braved through all this adversity and evolved a technique of cultivation which made him famous when the hour came.

Then he showed that he could produce nearly seven times the normal yield, that is, 11,255 lb. as against the normal 1,700 lb. per acre. And still he is persevering towards better results.

Nor is this his only achievement, for he has created in the neighbourhood (in the whole Aruppukottai Taluk of Ramnad district to which his village belongs) a commendable spirit of emulation; there is now a distinct Stackanovite spirit in the air; the local peasants are giving their sturdy individualism a new and better shape. They are vying with one another in trying to raise a high paddy yield per acre and to qualify for any or all of the official awards; and, as a result, old village jealousies and rivalries are being transmuted into healthy competition. Thevar is doing everything in his power to foster this spirit; he gives free advice to the many who seek it from him.



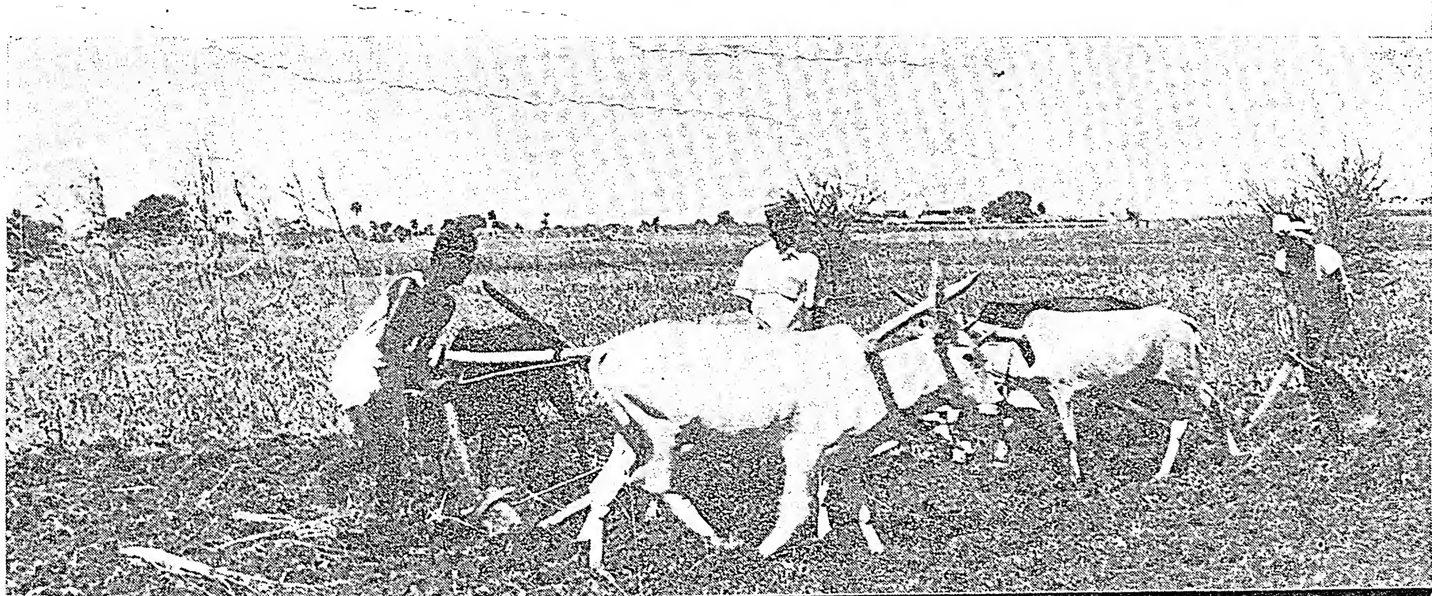
Looking at the new bund former. The farmer is keen on trying better implements on the farm

A SCIENTIFIC FARMER

If a man who has been able to grow two grains of corn where only one had been growing may be called a scientist, Thevar is certainly a scientific farmer. Conservative by temperament, Thevar derives his knowledge, uncanny as it looks, entirely from his own incessant observation; he is not, however, a sceptic in modern methods of cultivation. In fact, he displays a zeal in experimenting new ideas.

Basically, Thevar's interest in the soil is not that of a mere scientist, for it is almost paternal. "Feed the soil well and wisely," says Thevar, "and the crops will take care of themselves." He believes that organic manures like green leaves, compost and cakes of *neem* and groundnut must form the first

Thevar at the plough. He pays good attention to the preparing of the soil before the crop is planted



line of fertilizers, to which chemical fertilizers could be added in due proportion varying with the soils.

Recounting his own experience with the plot which brought him the prize, he tells his visitors how it all started immediately after the previous harvest. He brought a pen of 1,000 sheep to fertilize that 0.82 acre plot. Four months later he gave the field a few ploughings taking advantage of the timely rains. A week later, he fertilized the field with 1,000 lb. of green (*avarai*) leaves and after another week gave it two more ploughings till the field became completely miry. At this stage he applied ten cart-loads of compost manure (224 lb. of superphosphate mixed in the pit), then a final ploughing, followed by the application of 800 lb. of groundnut cake.

Now he levelled the land with the levelling board and planted the paddy seedlings brought from a dry nursery. Of course, he planted carefully—by putting two or three seedlings in a hole with a spacing of seven to eight inches. The first weeding was done by him 25 days after the date of transplantation and topping of the leafy portion after still another fortnight, since the crop had too much vegetative growth.

Again, the land was manured with 336 lb. of groundnut cake and 40 lb. of ammonium sulphate. The crop took on good growth and on the 75th day of the crop, topping of the vegetative growth was done for the second time. At the same time, the second weeding was given. Then he applied 224 lb. of *neem* cake. Just a fortnight before flowering, topping was done for the third time to prevent lodging and about 40 lb. of ammonium sulphate was applied to the crop the next day.

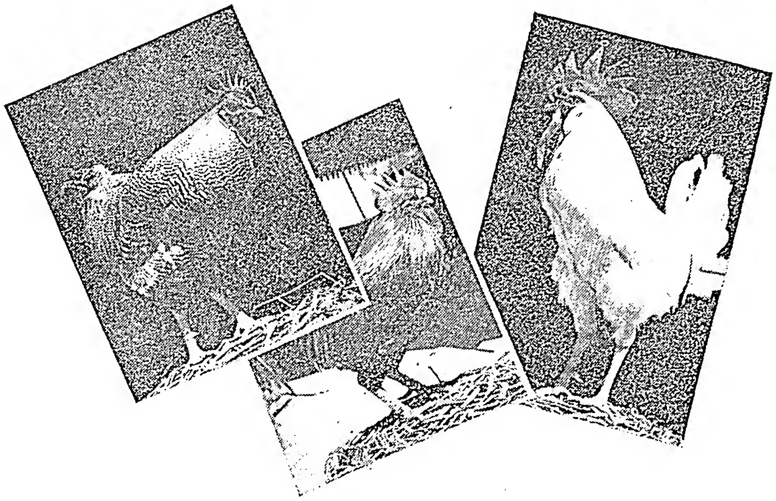
PEST CONTROL

Green jassids were found on the nearby fields and as a measure of protection 30 lb. of Gammexane D-120 were dusted on the crop. This prevented the pests from attacking the crop. The duration of the crop was 6½ months and the variety of seed used was 'Vellai Sirumaniam,' a local variety noted for its heavy yield. The crop was harvested in the presence of agricultural officials and prominent ryots.

Thevar has sunk a big well in his farm and has received a Government subsidy for installing a pumping set to assure a good water supply.

He is now experimenting on potato and mesta cultivation. Potato is usually grown in the hills but the Agricultural Department is introducing a new variety for cultivation in the plains. Thevar is one of the pioneers of this experiment. Mesta is useful for the fibre it yields and also for its seeds from which a lubricating oil is extracted. The results achieved so far are quite satisfactory.

The vast tracts of barren land lying uncultivated around the village offer a challenge to a man of Thevar's calibre. His eyes glow when he tells his visitors how he longs to convert all the land into smiling paddy fields. This he would accomplish, when he wins a tractor in the all-India crop competition.



A good number of breeds are available for the poultry-keeper to choose from. The keeping of mongrels in any case is false economy

THE BREED YOU SHOULD KEEP

by

S. G. Iyer

ONE common question poultry-keepers ask is what is the best breed to keep ?

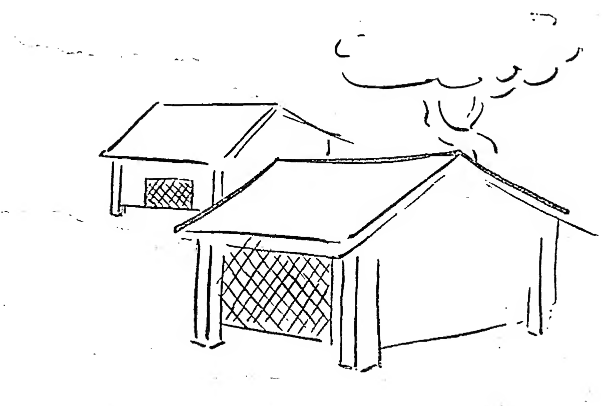
Many poultry farmers have been selecting pure-bred stocks generation after generation for the purity of type, colour or production. Such stock is more likely to produce offsprings with several of the desired characteristics and are any day worth the trouble than mongrels whose worth is never certain.

Certain breeders claim that a crossing of breeds stimulates egg production and improves the quality of meat. This may be true, but the same benefits can be obtained in a satisfactory way by sticking to one breed and giving it all care and attention. The keeping of mongrels is false economy.

Markets do influence the type of breed to keep. The breeder producing brown eggs is at a disadvantage when the market pays more for white eggs. A few years back, one would not have minded paying even a high price for a pure-bred stock and would even import them from outside. Subsequent difficulties in obtaining fresh blood resulted in breeding and cross breeding without thought to selection until the birds deteriorated greatly and became useless for breeding. However, things have changed now and there has been an improvement in poultry-keeping. Some of the Indian bred birds can very easily compete with those imported from overseas. Supplies are available from many individual poultry-breeders as well as Government farms, and it is possible to procure new stock unrelated to one's own birds.

All improved breeds have come from Great Britain, Australia or America. Importing of birds from Great Britain is becoming an important business in Bombay, Poona, Bangalore and other places. Imported birds are many times seriously affected by the voyage and take months to recover. There is also the fear of their bringing in new diseases. It is, therefore, best to demand a veterinary certificate regarding the birds prior to their export.

Ten-month old birds seem best for import as they stand the journey better and get acclimatised more



readily than older ones. The best time of the year to import birds is during the months of October and November because then they have to pass through the winter months before getting acclimatised. During this time chickens should be hatched in numbers and reared from them. The hot weather and rains may affect them adversely and, therefore, you have to pay a little more attention during these trying months. If they tide over the first year without any mishap, the hens will certainly do better in the second year and chickens will also be stronger then.

Hatching eggs can also be imported. The secret of success, however, lies not in starting with good birds alone but with carefully selecting, mating and breeding them.

VIGOROUS BIRDS NEEDED

A pure-bred hen laying 150 eggs in a year produces about three times her weight. For such a hard job a hen needs to be vigorous. The vigour is indicated by a bright full eye, bright red comb and wattles and a strong body with well-placed legs. A poultry-keeper, with some experience, can develop the ability to distinguish a good bird from a poor bird.

Many breeds are available for selection, but the strain is more important than the breed itself. Breeds such as the Rhodes, Leghorns, Minorcas and the Plymouth Rocks are preferred by poultry-keepers to a greater extent because these breeds have been bred for a number of years and have gained popularity in the country.

All fowls belonging to the American class which include Plymouth Rock, Rhode Island Red and Wyandotte, possess qualities which make them popular for the production of meat and eggs. They are birds of good size and have good meat. They are also clean-legged and have yellow skin and big shanks. All of them lay brown-shelled eggs.

Birds belonging to the Asiatic breeds such as the Orpington, Cornish and Sussex are of good size and noted for their excellent fleshing properties. They all lay brown-shelled eggs. The Orpington and the Sussex have a white skin while the Cornish has a yellow one.

The breeds of Mediterranean origin which include the Leghorn, Ancona and the Minorca possess qualities which make them popular as egg-producers. They are clean-legged with the Leghorn and the Ancona having a yellow skin and the Minorca a white one. All lay nice white-shelled eggs.

Fertilize Your Vegetables

Use the right fertilizer in the right dose and at the right time

ALMOST all vegetable farmers these days are using fertilizers for raising their crops. Not many of them, however, are conversant with the best way these fertilizers can be used for increasing vegetable production. When unexpected failures of crops occur, fertilizers are mostly blamed. It is quite possible that the real reason lies in the careless and indiscriminate use of fertilizers. Hence, it is necessary that fertilizers must be chosen with always the desired objective in view.

Farmers know that the three important plant foods necessary for the production of good vegetables are nitrogen, phosphates and potash. The fertilizers available in the market either provide one, two or all the three foods.

Nitrogen may be supplied as sulphate of ammonia, nitrate of soda, calcium cynamide (nitrolim) or as oil-cakes. Oil-cakes also contain some phosphates and potash. Superphosphates and bone-meal are the common sources of phosphates and muriate and sulphate of potash of potash. Generally speaking, sulphate of ammonia can be used for supplying nitrogen, superphosphate or bone-meal for phosphates and sulphate of potash for potash. These are best used in the form of a mixture.

WHAT NITROGEN DOES

Nitrogen encourages the development of leaves and shoots and imparts a deep green colour to these. It also makes the vegetables succulent. Nitrogen, say, in the form of sulphate of ammonia, should be applied to leafy vegetables like spinach, cabbage, lettuce, etc.

Tuber and root crops like carrots, turnips, potatoes, etc., and leguminous crops like peas, beans and the like should be given phosphates in the form of bone-meal or superphosphate. This fertilizer hastens the maturity of crops, promotes root development, improves the quality of the crop and increases resistance to disease.

Potash is essential for producing under-ground crops like onions, sweet potatoes, etc. A deficiency of potash results in abnormal leaf colour and weak stems. A mixture of potash and phosphates is considered necessary for the proper development of fruits and flowers. Such a mixture also increases the sugar-content of fruits, apart from speeding up their ripening.

For the plants to utilise the fertilizers properly lime also needs to be added to the soil. A dose of three to four ounces of powdered lime-stone per square yard of the area sown may be sprinkled over the soil a month before fertilizers are applied.

Farmers can sometimes find out whether the soil is deficient in any essential plant food by the look of the plant.

LACK OF NUTRIENTS

If the leaves show poor growth and have a yellowish colour, it is an indication that nitrogen is lacking in the soil. If the leaves show a greyish colour, it means that phosphates or potash are lacking in the soil. Lack of nitrogen, potash or phosphates results in a premature shedding of leaves. When the leaves appear scorched, it means there is an excess of lime in the soil, while if they are dark coloured and show curling, lime is lacking in the soil. If leaves are not uniformly green then it is an indication of insufficiency of potash in the soil.

Lack of potash gives fruits like tomatoes an irregular form. A scorched appearance in fruits is generally due to lack of nitrogen.

If grains, pods and roots are slow in ripening, it may be taken that there is an excess of nitrogen in the soil or a lack of phosphates. Lack of potash results in a failure of the fruits to ripen, while stunted roots are generally due to lack of lime and/or phosphates.

Farmers are again reminded that it is better to apply the fertilizers in the form of a mixture rather than singly. Experts have worked out recommendations on fertilizers for application to various vegetables. According to them the following are good schedules for application to summer vegetables:

For *arum* (*arvi*) and sweet potato, apply 200 lb. each of ammonium sulphate, superphosphate and sulphate of potash per acre before ridges are made. For bitter gourd (*karela*), sponge gourd (*luffa*) pumpkin (*petha*) bottle gourd (*loki*) and red pumpkin (*sheeta phal*) apply 100 lb. of ammonium sulphate, 250 lb. of superphosphate and 80 lb. of sulphate of potash per acre before sowing. Cucumber (*kheera*), squash (*vilaiti kaddu*), snake gourd (*chichinda*) and *parwal* need 100 lb. of ammonium sulphate, 300 lb. of superphosphate and 50 lb. of sulphate of potash per acre before sowing. Melons (*tarbuz, kharbuza*) require 250 lb. of ammonium sulphate, 400 lb. of superphosphate and 100 lb. of sulphate of potash per acre. Addition of lime at one ounce per square yard is also found helpful to the melons.

Bhindi, brinjal (*baingan*) and chillies need 250 lb. of ammonium sulphate, 600 lb. of superphosphate and 150 lb. of sulphate of potash per acre. If you are growing plantains (*kela*), apply three pounds of ammonium sulphate, three pounds of superphosphate and one pound of sulphate of potash per plant in the first year and one pound of ammonium sulphate, half a pound of superphosphate and quarter pound of sulphate of potash in the second year.

FOR WINTER VEGETABLES

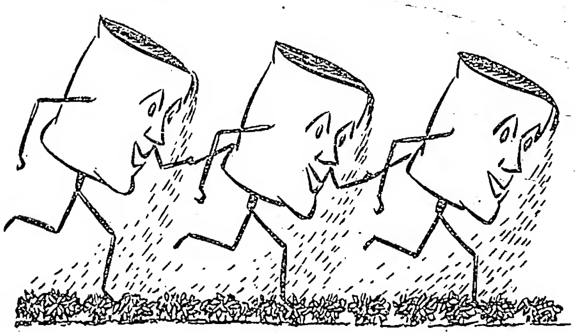
The following are the fertilizer schedules for winter vegetables :

Give 250 lb. of ammonium sulphate, 600 lb. of superphosphate and 150 lb. of sulphate of potash per acre for your tomato crop. Three-fourths of this can be applied at planting and the rest before flowering starts. No lime is necessary for tomatoes. For onions give 200 lb. of ammonium sulphate, 750 lb. of superphosphate and 150 lb. of sulphate of potash per acre. If poor colour or a development of thin scales is seen, add 50 lb. of copper sulphate per acre to the soil.

Beans (*bakla sem*), French beans and lablab (*sem*) require 200 lb. of ammonium sulphate, 400 lb. of superphosphate and 100 lb. of sulphate of potash per acre before sowing the crops. Similarly, peas require 100 lb. of ammonium sulphate, 300 lb. of superphosphate and 50 lb. of sulphate of potash before sowing. For carrot (*gajar*), beet root (*chakandar*), radish (*mooli*) and turnip (*shalgam*), apply 250 lb. of ammonium sulphate, 500 lb. of superphosphate and 200 lb. of sulphate of potash per acre.

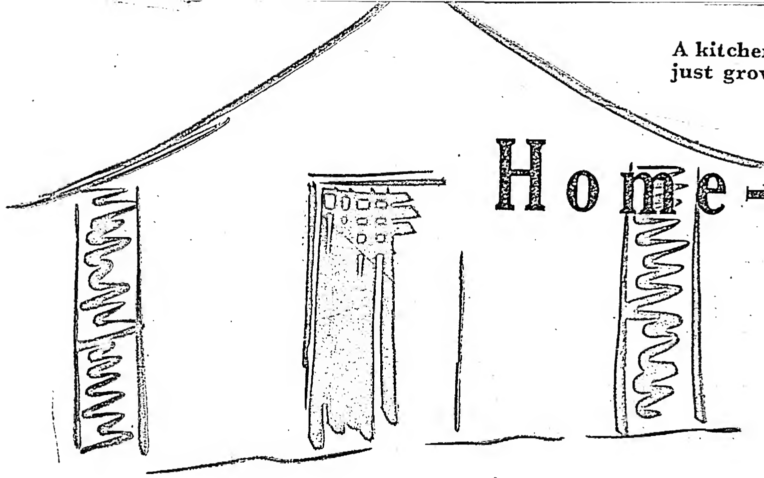
For beet root and turnips add one ounce each of lime and salt 15 days before sowing.

For potatoes (*alu*) no lime is necessary, but apply 500 lb. each of ammonium sulphate and superphosphate and 50 lb. of sulphate of potash. For lettuce (*salad*), celery (*shalary*), spinach (*palak*) and Indian green (*sag*) apply 400 lb. each of ammonium sulphate and superphosphate and 50 lb. of sulphate of potash. Lime need not be applied to these vegetables unless found necessary.



Cabbage (*bandh gobhi*) requires 200 lb. of ammonium sulphate, 500 lb. of superphosphate and 100 lb. of sulphate of potash. The mixture

(*contd. on page 21*)



A kitchen-gardening experiment that was more than just growing a few crops for home consumption

Home-Stead Farming

by

B. L. Choudhry

I WOULD prefer to call it kitchen-gardening. In a broad sense, it is to meet all the needs of a kitchen from an available, though small, plot of land.

Almost all the Sarvodaya centres in India take to homestead farming or kitchen-gardening on whatever area that is available for this purpose. Such a farm helps in achieving self-sufficiency in food and vegetables, the degree of sufficiency depending largely on the area of land available. It will also mean putting into actual practice what is being preached by way of dignity of labour.

Homestead farming offers the workers to look to something as their own to work on. Otherwise, they are likely to feel frustrated in a village atmosphere.

Incidentally, this type of farming offers possibilities of finding out the basic needs of a family on a small farm, the ideal being that a small farming unit should provide full employment for a village family and make it self-supporting. It will also be possible to work out the economics of such a unit.

At the Sarvodaya Centre, Taronda-Nitaya, Hoshangabad, an experiment on homestead farming was undertaken which gave us a way to live at the villagers' level of living. At the Centre here, we are six in all, three of us trained in agriculture and the other three being youths from the villages getting themselves trained in agriculture. Besides the six, a Kasturba Gram Sevika and my wife also help in jobs like transplanting, picking fruits, etc. from time to time.

A small plot of 0.79 acre, with big trees and thorny shrubs had been given to us as a donation. We cleared this out for building houses for the workers. These occupied 0.29 acre.

Later, we were permitted to occupy a government plot of 1.42 acres. We exchanged this for

The wheel barrow really took the load off our heads

another plot attached to our own. The farmer who did the exchange allowed us the use of a half acre of his land in addition. Thus we had to our credit a consolidated area of 2.7 acres. The village road, however, goes through the plot, splitting it into two.

This plot suffered from some disadvantages, however. The soil was of inferior type. It had been badly eroded. No manuring had ever been done to it. Being close to the village, we also had to face the nuisance of stray cattle.

We wanted to experiment and find out what crops could be grown there best. But since we got possession of the area in June 1953, we had very little time for that. However, we planned on a broad basis and decided to put vegetables in one block and wheat in another.

GARDEN OPERATIONS

All operations such as digging, preparation of seed-bed and field for sowing, mulching, irrigating, weeding and harvesting were done by the workers and no outside labour was engaged. During the peak time, every one of us gave as much as 10 hours of labour a day. Later on, however, the work needed only about three hours of our time. That gave us latitude for other work.

Land improvement work was done on a contract basis. The wheat plot was harrowed and ploughed by the villagers and later at sowing time and when the villagers could not spare their bullocks and implements, we had to engage bullocks on hire.

We got three CARE tool kits on donation and two improved iron ploughs as gift. We had an excellent wheel-barrow, placed at our disposal by the Friends' Rural Centre, Rusulia. With a little practice, we gained sufficient proficiency in the use of these implements and found them efficient and easy to work with.

WRONG DECISION

Since our unit could not support a pair of bullocks, we did not maintain any. When the question of irrigation came up, we had to decide whether we should go in for a Persian wheel and a pair of bullocks or an oil engine. Due to various considerations, we finally decided on the oil engine. We regretted, however, our decision later. When under village conditions even to get a nut or a bolt for the engine is difficult, it was wrong to have thought of an oil engine. Our set went out of order, especially when we needed it most, and our plan for supplying water to our crops was completely upset.

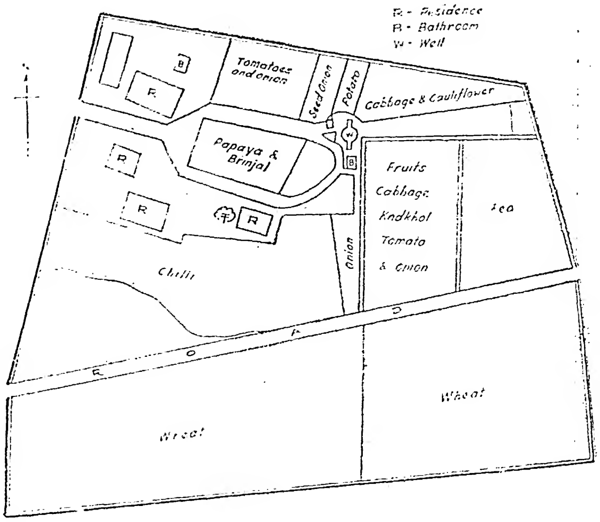
To find out what manurial doses were best suited for wheat and to show the villagers the merits of manuring the crop, we laid out a small experiment on our plot.

The variety of wheat we sowed was No. 25. The crop received a basal dressing of five cart-loads of compost per acre. The fertiliser treatment we tried was the application of ammonium sulphate, phos-

Onion for seed and cauliflower were grown in combination

phonil, ammonium nitrate and amophos in different plots at 50 pounds per acre. The fifth plot did not receive any fertilisers. The fertilisers were applied with the seed. The crop received one irrigation. We harvested the plots separately and got the following per-acre outturn :-

Plot receiving	*Yield per acre*
Ammonium sulphate	1,260 lb.
Phosphonil	1,370 lb.
Ammonium nitrate	1,330 lb.
Amophos	1,300 lb.
No fertilizer	980 lb.



This was the lay-out for our homestead farm

The experiment was purposely laid out close to the village road so that it might serve as a small visual demonstration for the villagers. The government farm at Powarkheda obtains about 2,400 lb. of wheat per acre on some of its fields. Our ambition is to raise our yield to 2,000 lb. per acre.

VEGETABLE VARIETIES

In the other block, we raised a variety of vegetables. Chillies, brinjals, tomatoes, cabbage, cauliflower (double-cropped with potatoes), knol khol, potatoes, garlic, radish, greens, coriander, gram, onions (both for bulb and seed) were the crops tried, each one of them occupying an area ranging from five cents to half an acre. We grew papaya in combination with brinjals, citrus with onion, and plantains with brinjals. Up to 0.40 acre was double-cropped. Excepting for onion raised for bulbs which failed for want of irrigation, the rest of the crops came up well and gave us an income of Rs. 616-15. On the expenditure side, we spent Rs. 368-7. Taking into account that approximately Rs. 40 worth of carrots, peas, green gram, etc., were given free to school children and we paid Rs. 80 by way of charges for harvesting the crops to members of the Youth Club, and also that we sold the vegetables at cheaper rates to encourage villagers to take to vegetables, our total income would have come up to Rs. 786-15, and deducting our expenditure from this, we would have had a net profit of Rs. 418-8.

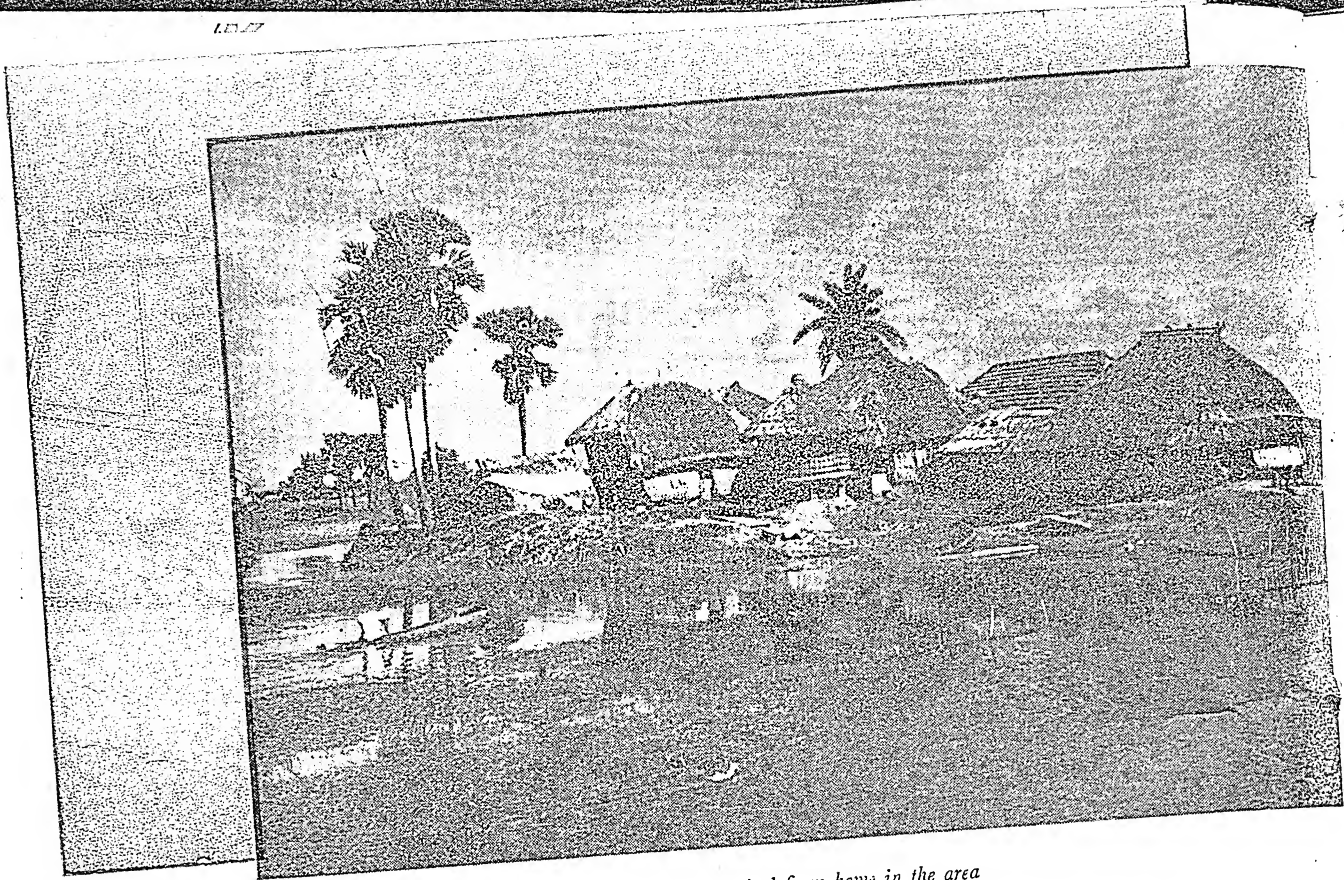
VALUABLE EXPERIENCE

The handicaps we met with notwithstanding, we got valuable experience in the homestead farming experiment that we conducted. It showed us that village service entries can be made self-supporting so far as food and clothing are concerned. An area of five acres will be a handy unit to work on. For such work, bullocks and not engine power should be relied upon. An initial outlay of Rs. 5,000 will be required to work such a unit. This expenditure will meet the cost of a well (Rs. 1,000), bullocks (Rs. 500), fencing (Rs. 500), seed, manure and accessories (Rs. 500), maintenance for the first year (Rs. 750) and a Persian wheel (Rs. 1,000).

On such a centre, at least two families of workers will have to devote their attention. On an average, not more than three hours need be spent on such work. Apart from growing crops, the maintenance of a breeding bull, bee-hive, a flock of poultry (depending upon the locality) and a set of improved tools can well be done on such a centre for the benefit of the villagers. The centre can then turn out to be a very good ocular demonstration for the entire village.

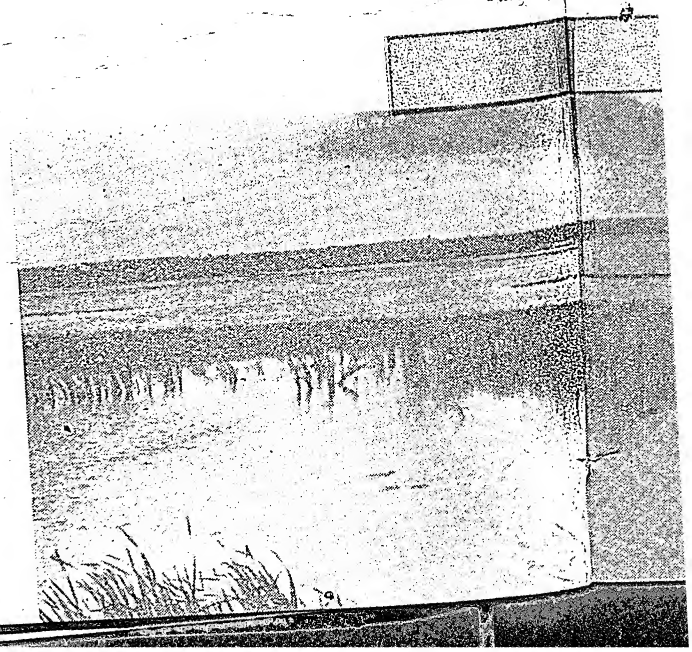
THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITORS, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.



A typical farm home in the area

From SWAMPS *to smiling* GREEN



Fields ready for the crops

THERE is nothing impossible to human endeavour and ingenuity. How else could the vast bleak marshes infested with aquatic weeds, venomous snakes and deadly malarious mosquitoes, only 28 miles south-east of the city of Calcutta, could once again be enlivened with agricultural activities ?

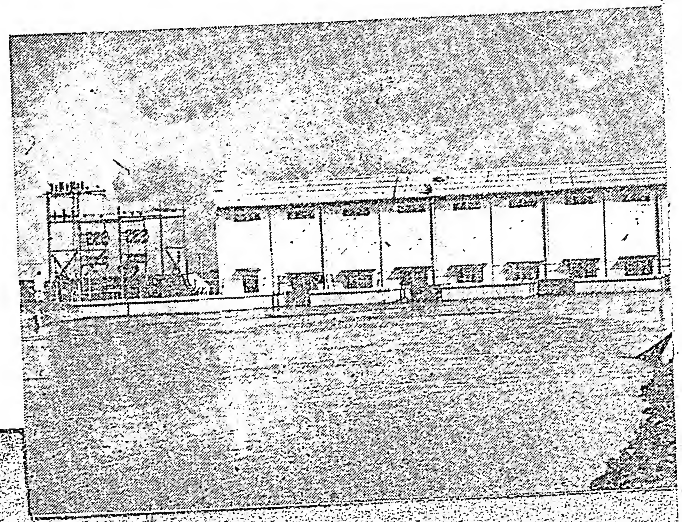
Due to the rapid siltation of the outfall of river Peali and lack of drainage facilities, a basin area of about 57 sq. miles under Sonarpur and Baruipur Police Stations had become completely water-logged, remaining unproductive for the last two decades. During the rainy season nothing could be seen in the area excepting a vast sheet of water dotted with widely scattered villages on small islands. These villages were inhabited by a most daring type of people bereft of all amenities of modern life and engaged in a perpetual strife for existence. Only during winter, the tranquility of the place used to be occasionally disturbed by the boom of the gun shots fired by the hunting parties coming from the city in search of game birds.

In a determined bid for reclaiming every inch of this land for the much needed food production, the Sonarpur-Arapanch Drainage Scheme was launched by the Government of West Bengal. An area of about 57 sq. miles bounded by the Tolly's Nullah and the Bidyadhari river on the north, the Peali on the east and the Baruipur-Uttarbhag Road to Garia on the west is sought to be brought under cultivation. This is a unique project in West Bengal and perhaps in India, under which swampy land is proposed to be reclaimed and brought under the plough by means of four gigantic electrical pumps discharging 3,75,000 gallons of water per minute.

The Scheme is also expected to provide electricity to the semi-urban areas of Garia, Sonarpur and Baruipur making them ideally suited for rehabilitation of displaced persons.

Already an area of about 30 sq. miles has been dewatered and made available for *kharif* and *rabi* cultivation. With the emergence of the land from its watery grave arose the dispute for ownership of land in some of the areas where delimitation of the boundaries was completely lost. Government, however, could lose no time in going ahead with the Scheme as the *kharif* sowing season was advancing fast.

The Directorate of Agriculture commissioned its fleet of 14 tractors with other mechanised units and a band of enthusiastic workers on the 13th June, 1953, for raising *aman* paddy on about 1,400 acres. Even under such heavy odds as frequent accumulation of rain water over the fields up to a height of about two feet or more having occasional water pockets, the inrush of water from the adjoining canals through breaches in the embankments, want of suitable seed-beds for raising seedlings and a thick growth of typhae and other aquatic weeds and the presence of venomous snakes, leeches and the foul stagnant water, the worker proceeded with the work with a resolute mind and the area having a perimeter of 13 miles without even the semblance of a shelter fell inch by inch to the advancing tractor ploughs and harrows. The wheeled type



The plant that pumps out water from the swamp

tractors were suitably modified by what is known as "Bower" attachment, for wading through knee-deep water and mud for various cultural operations—a unique feat in low land cultivation in the country. With perfect co-operation from the different Government Departments and the local people the work progressed in a nicely planned way.

In the meantime organisations were also set up to settle the land disputes and the owners whose lands were tilled by the Directorate of Agriculture were entitled to get one-third of the produce obtained on production of the proof in support of their claims. The balance of two-thirds was to be distributed, to the extent felt necessary by the Government, as improved seed in the surrounding areas.

In this way, it has been possible to get a good harvest of *aman* paddy crop from a vicious swamp of about 900 acres. Twenty-one thousand maunds of paddy and 30,000 md. of straw have been obtained in one cropping season, yielding a gross income of Rs. 2,06,000. The expenditure incurred under the different heads amounted to about Rs. 1,56,965 till the end of March last. Owners of the land have after a lapse of 20 years, for the first time, received their share of the produce on presentation of proof of their claims.

The neighbouring farmers who had first watched the operations with doubt, were soon imbibed with a spirit of enthusiasm to take up cultivation of their freshly reclaimed land, and in consultation with the local officers of the Department of Agriculture, often being helped with seedlings, agricultural cash loans, etc., have successfully cultivated nearly 11,000 acres which had not got the touch of a plough for a long time.

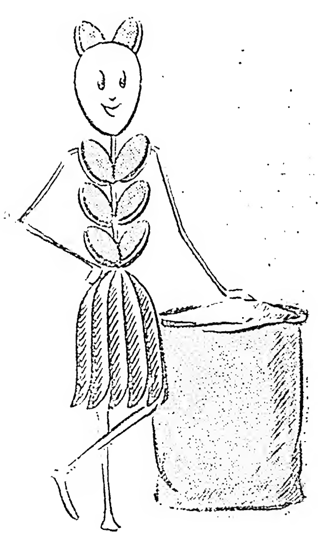
WHAT'S NEW IN FARMING

GREEN MANURING

GREEN manuring, one of the easier ways of increasing soil fertility, is gradually spreading on Indian farms. The practice is being widely adopted in Uttar Pradesh, particularly, in the Mahawa circle in Etawah district. Farmers here are of opinion that crop yields are much better when green manure is used than when chemical nitrogen is used.

A recent survey showed that with green manuring the yield of wheat per acre was 35 md. 20 sr. 6 ch., whereas with the use of ammonium sulphate the yield was only 29 md. 29 sr. and 5 ch.

Experience has shown that sannhemp, indigo, *dhaincha*, *guar*, *senji* and *Moong* No. 1 are more suitable for green manuring. They are capable of supplying 30 or more seers of nitrogen per acre and about 300 maunds of vegetable matter. If green manuring is intended for the winter crop, the seed should be sown immediately after the first rains in the preceding monsoon season. Where irrigation is possible, the seed may be sown a little earlier so that the crop may attain greater growth before it is ploughed under. If the green manure is meant for monsoon crops, seed should be sown in winter, but this is possible only if irrigation facilities exist.

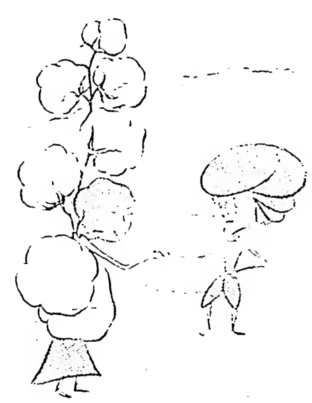


The right time to plough under the green manure crop is when the plants are just about to flower. A couple of showers after the crop has been ploughed under are essential to help the standing green matter to decompose. The crop should be planked down before ploughing. When the plants lie parallel to the direction of the plough, the green manure will be more completely buried by the soil-turning plough than when the plants stand erect. It may be advisable to plough the area a number of times, so that the decayed vegetation may be thoroughly mixed with the soil. This usually takes from four to five weeks.

Green manuring is, incidentally, the least expensive among different methods of nitrogenous manuring.

LAXMI COTTON

Laxmi, an outstanding type of cotton grown largely under rain-fed conditions in the Gadag area of Bombay State, is doing very well in the Bellary district in Andhra State. The new cotton was introduced two years ago and in spite of droughty conditions that prevailed during the time, has yielded one and a half times Westerns which had occupied the area till now.



Laxmi has also been found suited for sowing in early and mid-seasons in mixed cropping with *korra* and groundnut in light soils and as a pure crop in the *mungari* season in heavy soils. The higher yields and prices of Laxmi have made farmers readily take to this variety and the area under it shot up from 5,000 acres in 1951-52 to over 30,000 in 1952-53 and in the 1953-54 season, it is estimated to occupy almost two lakhs of acres.

DRY SEED-BEDS FOR RICE

Some modifications in the method of raising dry seed-beds advocated under the Japanese method of rice cultivation were successfully tried recently at the Paddy Research Station, Titabar. The modifications were necessary because of the heavy rainfall conditions prevailing in Assam.

The seed-beds were prepared under semi-dry conditions. They were of the dimensions 50 ft. × 4 ft. and raised about six inches above ground level and the space between individual plants was increased to one and a half to two feet. The edges of the seed-beds were reinforced with rice straw, water was then let in and the channels kept flooded.

Sprouted seeds were sown in the seed-beds. This gave the advantage of the seed getting quickly fixed in the soil, minimising loss of seed.

The seed-rate of one pound for 50 ft. × 4 ft. seed-bed advocated under the Japanese method was found suitable for the medium varieties but for the coarse varieties, it was increased to one and a half pounds and for fine varieties, less than a pound was used.

Another modification introduced was to increase the width from four feet to eight feet, as under puddled conditions the weeding of the seed-bed was not found necessary.

The seedlings grew quickly and were ready for transplanting in three to four weeks.

★

GETTING THE VILLAGER TO WORK

Way to conduct village group discussion for leading villagers to co-operative action

MANY of the major problems of the Indian village can be solved only through co-operative action.

A well-organised village group discussion, properly conducted, is the best practice for co-operative group action. In fact, it is the first step in co-operative effort.

Co-operative group action requires the skill of all members. It requires that the villagers develop the habit of talking, thinking, planning and working as a group.

People become accustomed to group action and become skilful in it only by practice. It is the Village Worker's job to give the villagers every chance to practise co-operative group action.

A discussion of this nature requires that each member should listen to the ideas of other members even though they may not approve of the ideas, but this type of discussion will give a chance to each member to express his or her own views. Members must learn to put the interest of the group above personal interest.

In a democratic group discussion, the leadership is shared among all the members instead of being monopolised by one person alone. This way all members get practice in leadership. Such a practice develops the type of unselfish and democratic leadership needed for successful co-operative group action or community development.

VILLAGE ACTION GROUP

As a village discussion group grows and gains confidence in itself, it will naturally become a village action group. The Village Worker must carefully lead the group to see the need for action.

Discussion in backward villages for the sake of discussion is ridiculous and futile. Without action these villages cannot improve.

In the beginning, it is the Village Worker who should assume leadership and initiate discussion to provide the needed initiative and knowledge. The group then should be so organised as to get the skill needed for democratic group action.

Joint action being the goal of these group discussions, his intention should be to see that ultimately the group attacks and solves a common village problem without his help.

The first step towards joint action will be getting a small group of villagers to meet and discuss a common problem. If it is not possible to get the villagers to meet as a group, it may be that the Village Worker can collect 20 to 25 villagers and advise them and guide them on some particular problem. If he finds that the problem is of interest to most villagers, it can then become the topic for the first discussion.

PRINCIPLES IN PLANNING

The Village Worker must put some general principles to work in planning. Firstly, he must be prepared for the discussion. For this he must study the problem to be discussed beforehand and think about it in relation to the interest and ideas of the group. He must have reference material, if possible, and also pictures or charts or any other visual aids that might help aid the discussion.

People think better if they are comfortable. Therefore, it is necessary to select the best meeting place and the most convenient time to hold the discussion. It would be also necessary to know the names of every member present there.

The group should be seated in a circle. Thereby every member would be able to see the faces of all others. The atmosphere of the meeting should be friendly and informal. The Worker must encourage all to take part in the discussion.

The group should be allowed first to define the problem. If that has not been done, a clear question should be put before the group at the commencement. The leader's opinion, however, does not count. His first job would be to bring out the ideas of the members of the group.

Speech-makers should be stopped. Speeches spoil group thinking. Talks must be limited to two minutes or less if possible. The speech-maker, however, should be stopped tactfully. If he is allowed to ramble on he will ruin the discussion. One way to stop him is by saying, "let us hear what some one else thinks about this idea." That 'some one else' can even be named. However, the rule should be to put direct questions to the group rather than to any individual. It is possible that some members are too shy to talk. Such people should be encouraged to take part in the discussion. Direct questions can be put to them to encourage them to join in the talk. It may also be indicated that the answers given are good by way of further encouragement. The ideas of any member of the group should never be ridiculed. The leader should keep the discussion moving, but never drive it sternly.

The discussion group should be guided towards action. It should be guided to take decisions and start planning.

TECHNICAL INFORMATION

The group should be led to seek technical information and help. It will need such technical help to solve several problems. It should be led to decide to consult specialists when the need for information arises. Members should be helped to make their own arrangements with specialists.

For presenting facts make use of visual methods. Visual materials like films, posters, exhibits and demonstrations often make a problem so real that the villagers readily see the need for action.

Sight-seeing trips should be arranged by the Worker for the villagers to get facts. The village discussion group can be led to plan trips to other villages where improved practices are being carried out. Sometimes progressive farmers from other villages may be invited to attend group meetings to narrate their own experiences and ideas.

In organising group discussions, the work of the village leader will resolve itself in the following steps:

(i) Recognising the common problem and getting the villagers to recognise the problem. If the villagers are already aware of it then this step will not be necessary;

(ii) finding the facts needed to solve the problem. Facts already known by members should be brought out in the discussion and when this is done the group should be led to seek facts from outside;

(iii) all known facts should be considered in relation to the local problem. Then the group should be made to examine and test all facts;

(iv) getting the group to reach a decision for action. Such a decision should be in agreement with the facts brought forth;

(v) planning a joint course of action. The plan has to provide the answers to who, when, where and how, what materials would be needed and how they could be obtained;

(vi) getting down to work. This is the goal of all discussion and planning. If this step is not reached, the Village Worker has as good as failed because it is this step that builds confidence and enthusiasm in the village. It is this step which draws villagers together as an effective group. Each time the villagers solve a problem by this method, they would be nearer to achieving the habit of co-operation.

(*Contd. from page 11*)

should be applied half at sowing and the rest before earthing up. Lime at one ounce per square yard will also be helpful.

Knol khol (*ganth gobhi*) should be given 400 lb. of ammonium sulphate, 600 lb. of superphosphate and 100 lb. of sulphate of potash per acre. For cauliflower (*phool gobhi*), a dose of 400 lb. of ammonium sulphate, 750 lb. of superphosphate and 150 lb. of sulphate of potash should be given.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay-7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

—*Editor*

Is Your Child Healthy?

A HEALTHY, growing child has an appetite, they say, like a horse.

He has other traits too. His eyes are bright and sparkling, movements brisk and active. His skin is of good colour with a quality of firmness and elasticity in it. His hair has a healthy, natural gloss. He shows steady good growth in weight and height. He enjoys life and with him in the house you enjoy life too.

But every household is not blessed with a child that gladdens the heart. You will find children pinched, puny, pale, thin or puffed out, flabby, small-boned, with the skin dull, the hair lifeless and eyes tired. Such children are listless and sluggish and lack enthusiasm for work and play.

MALNUTRITION

These are the children that suffer from malnutrition. They may have a dry, rough skin which loses its elasticity or may develop a shiny appearance. The front and sides of the thighs, and the back of the arms and the shoulders of such children will, probably, be rough to touch.

This condition is due to a lack of vitamin A in the food given to them.

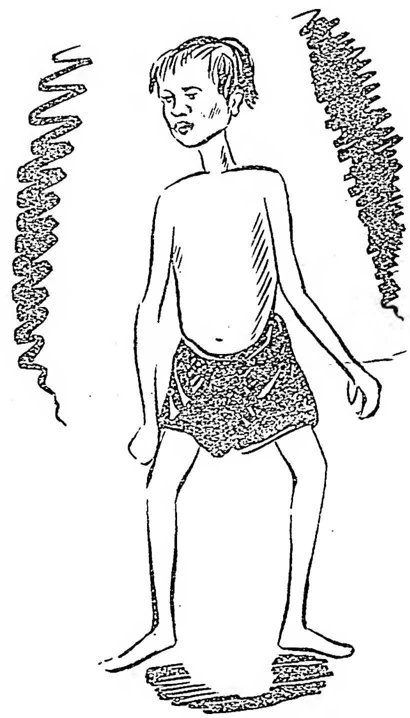
The vitamin being very essential to health, the child develops, what is called night blindness. The child's eye-sight, which is normal during day time, fails completely at night.

WORSE EFFECTS

If this vitamin-shortage is allowed to go on for some time further, worse effects will be seen in the child. The white of the eye loses its glistening whiteness, gets dry, dull and smoky and later will tend to wrinkle. If this condition is allowed to continue, it may ultimately destroy the eye of the child.

The condition, however, can be corrected by feeding the child with foods rich in vitamin A. Shark or Cod liver oil, butter, eggs, spinach and other green leafy vegetables and fruits like mangoes, papaya and tomatoes are some of the foods rich in vitamin A.

It is common for children to lose appetite and lose vigour. Such children will also have digestive disturbances and are easily irritable. Such a condition is mostly seen in children for whom milled or polished rice forms the main diet.



To correct this defect, which is due to lack of vitamin B in the diet, children should be fed with green leafy vegetables, groundnut or eggs and fleshy foods for those who may partake of them. The liver is an excellent source of this vitamin.

VITAMIN B DEFICIENCY

Vitamin B deficiency also leads to little heaps of whitish sodden skin at the corners of the mouth and fissured and sore angles. Sometimes the tongue will also be red and sore. The remedy would be naturally to give the child the missing element in the food. Milk which is rich in this, is specially recommended for the growing child.

Another disease caused by vita-

min B deficiency shows symmetrical patches of redness on cheeks and hands, looking like severe sun-burn. Later on, these parts and specially the face, hands and feet, get rough and ulcerated. Diarrhoea may also be caused. To get over this defect, children should be given wholemeal *atta*, good *dal* and groundnut.

Another disease associated with children is what is known as scurvy. Sore spongy gums with a tendency to bleed easily and sometimes bleeding from the nose or patch in the skin can also be seen. The disease is due to lack of vitamin C. Hence, children should be given foods containing this vitamin. Fruits and green vegetables and tomatoes are rich in vitamin C.

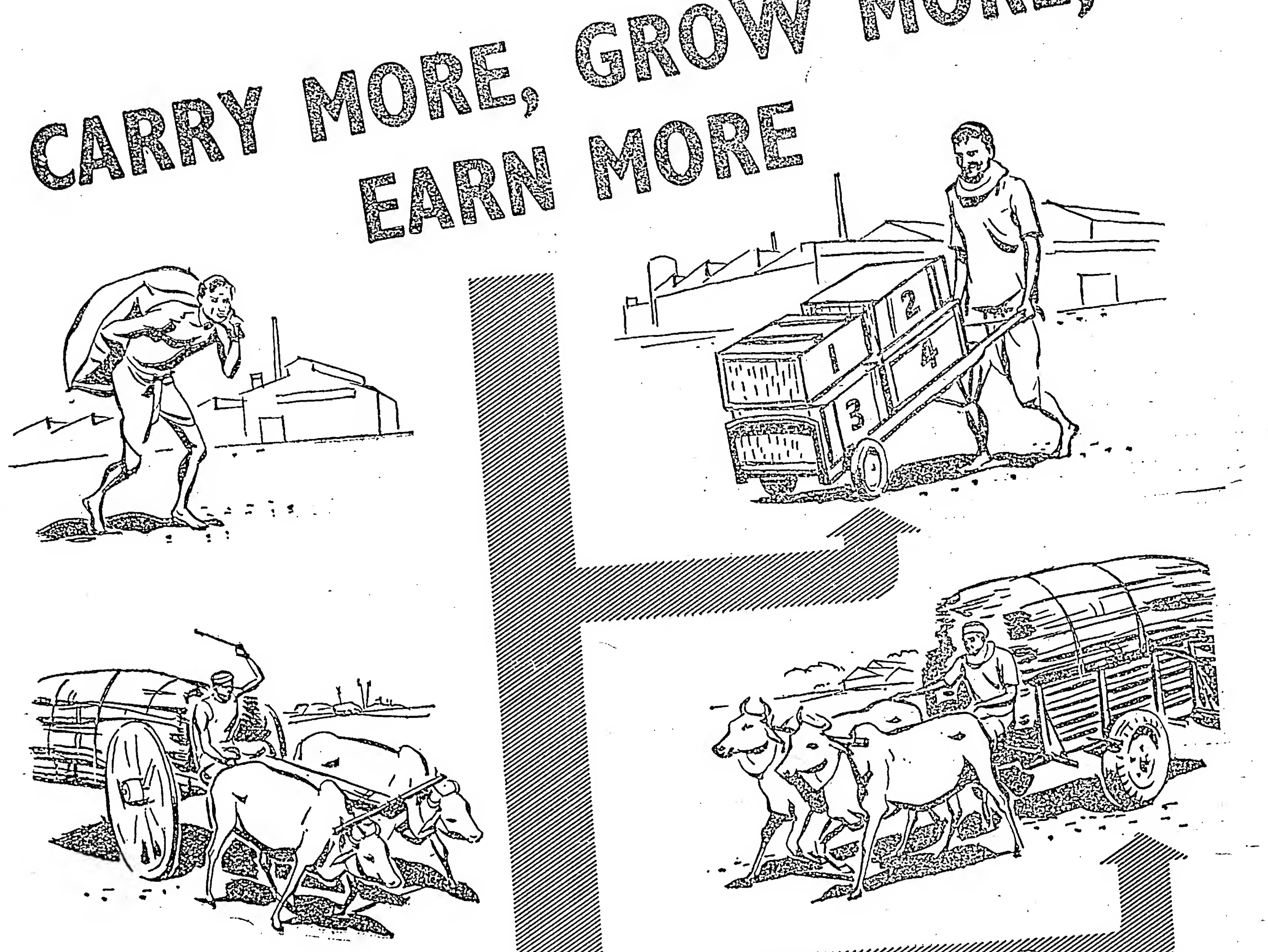
If you look at the child's teeth and find ill-fitting or bad biting teeth or prominent or distorted teeth, it may all be due to lack of vitamin D and calcium in the diet.

MALADJUSTED TEETH

It is so difficult to set right maladjusted teeth at a later stage, and since teeth are so essential for chewing the food properly, correct feeding of children is very important.

Vitamin D and calcium deficiency also causes rickets causing bow legs or knock-knees. Fortunately, the sun provides vitamin D in abundance and children romping in the sun will get enough of it, but the body must have enough calcium and hence the intake of milk and green vegetables should be sufficient to supply the deficiency.

If the mother were to take sufficient precautions to see that the child gets the vitamins so essential for the health and growth of the child, it will not be a victim of deficient diseases.


CARRY MORE, GROW MORE,
EARN MORE
1
2
3
4
WITH
DUNLOP
EQUIPMENT
J. B. Dunlop
TRADE MARK

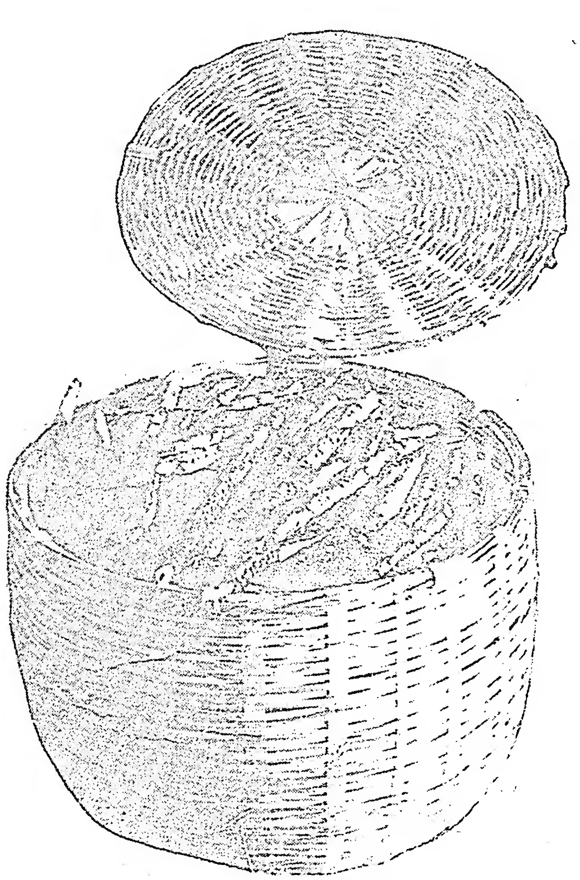
With some improvements, can be a more paying subsidiary occupation

LAC CULTIVATION

by

A. P. Kapur

Entomologist, Indian Lac Research Institute, Namkum, Bihar



Broodlac packed in a bamboo basket and ready for despatch by rail or road

TO a large number of rural people in some of the states of the Union, lac cultivation provides a paying subsidiary occupation. Apart from this, lac is a valuable foreign exchange-earner, the annual exports averaging Rupees ten crores and over in recent years.

Lac is produced by a small insect, the lac bug, which, when newly born, is much smaller than a pin-head.

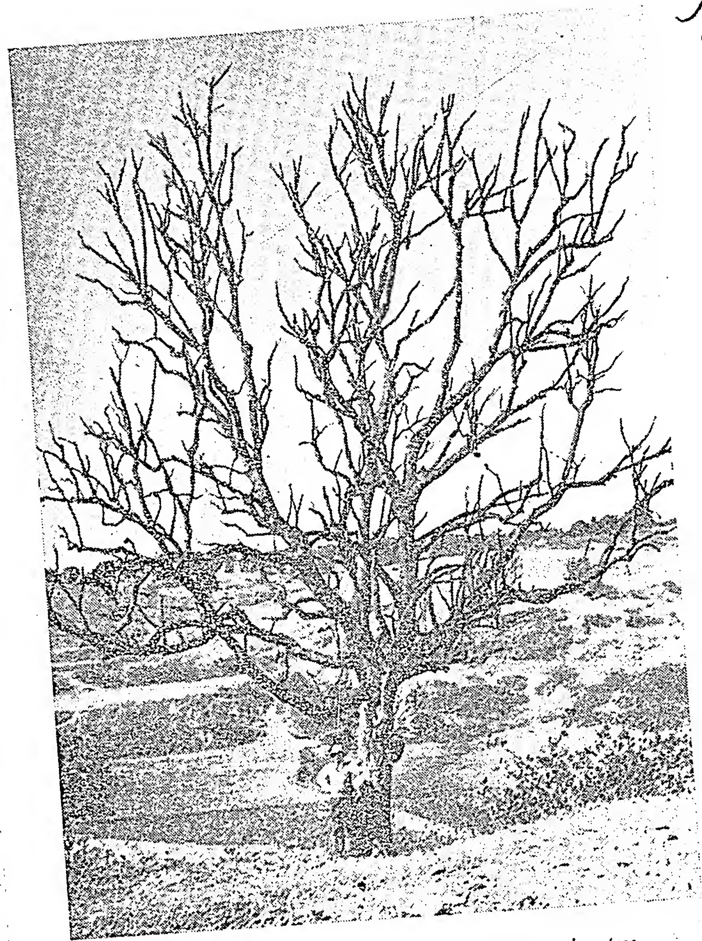
India is a chief source of supply of lac in the world, its annual production being nearly 80 per cent of the total world production. Though Thailand and Burma also produce lac of some commercial importance, because of its superior quality, Indian lac is generally preferred. Lac is found in most parts of India but the more important States which produce it are Bihar, Madhya Pradesh, West Bengal, Vindhya Pradesh, Assam, Orissa, Bombay and Uttar Pradesh. Other States like the Punjab, Madhya Bharat, Bhopal, Mysore and Madras also produce lac, but in smaller quantities.

Of the total of about 11,42,000 maunds of sticklac produced annually in the Union, Bihar (Chota Nagpur Division, Santhal Parganas and Gaya district) alone account for more than half of the production (about 6,73,000 maunds annually). Areas adjacent to Bihar in Madhya Pradesh, West Bengal, Vindhya Pradesh and Orissa are also important producers. Mikir, Garo and Khasia Hills in Assam have been well-known sources of sticklac from the early times.

The cultivation and collection of lac is mostly in the hands of farmers and aborigines who live on the outskirts of forests where host plants on which the lac insects thrive abound. Mostly, small agricultural families who acquire on lease or own a few scores of trees on their holdings, practise lac cultivation. The investment thus is very little and since the operations are looked to by the families, expenditure also is brought down to a minimum.

Lac cultivation is a very important subsidiary occupation of Chota Nagpur farmers, as elsewhere. It is better so as being a subsidiary occupation, it ensures

Selecting broodlac prior to infection or marketing



A pruned tree of kusum. *As it is a slow-growing tree, it should be pruned lightly*

low cost of cultivation and low sale price, thereby keeping off keen competition from synthetic substitutes, which there would certainly be if prices of lac were to rise. Under the present conditions it does not look as if lac cultivation can be done cheaply on plantation basis unless cultivation methods are radically changed to reduce expenditure on higher labour and supervisory charges.

The lac insect lives on the sap of certain plants, the more important of which are the *palas* or *dhak* (*Butea monosperma* Syn. *B. frondosa*), *ber* or *kul* (*Zizyphus jujuba*) and *kusum* (*Schleichera trijuga*). The young ones of the insect or nymphs, as they are called, settle rather gregariously upon succulent shoots of these plants and start secreting lac round their bodies. Within a short time, this secretion takes the form of small lac cells with three openings through which waxy filaments of the insect protrude which can easily be seen with the naked eye. The grown-up female, however, is very unlike other bugs and has a body somewhat like a bag enclosed in a resinous cell. The cell itself may be roundish or oblong; but is usually not more than 1/8th of an inch long when fully formed.

The male is much more like other insects in shape and has three pairs of legs, a pair of antennae, the eyes and in certain cases a pair of wings. This also develops inside a resinous cell which is elongate in shape. It is much smaller in size than the female and has a shorter life.

As the lac insects grow, thousands of lac cells, situated close together on a twig, coalesce and come to form a contiguous encrustation of lac.

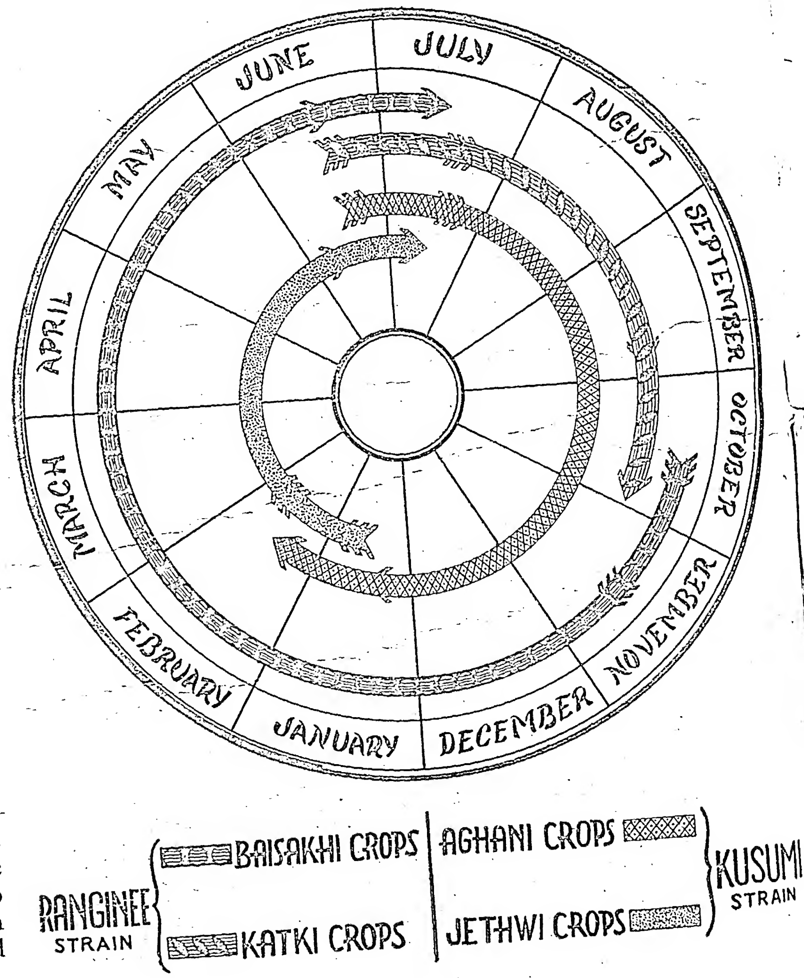
Sometime before the young ones emerge, the crop is usually harvested by cutting down lac-bearing branches. Those bearing healthy encrustation with gravid females are termed broodlac. These are tied into bundles and the broodlac is used for infecting other trees for the next crop. The rest of the lac as well as the broodlac after the insects have completely emerged is usually scraped off the twigs and sold in the market as scraped lac or sticklac.

The sticklac is subjected to various processes of cleansing and refining, yielding commercial grades of seedlac, shellac and cotton lac. These go for the manufacture of gramophone records, paints and varnishes and are also used in electrical and numerous other industries in India and abroad. The lac-bearing branches of trees cut at the time of harvesting are used as fuel and if thorny, as in the case of *ber*, utilised for fencing the field by the farmer.

Generally speaking, there are two strains of lac commonly grown in India. These are called the *Rangeeni* and the *Kusumi* strains.

Each strain completes its life-cycle twice a year, but the durations of their life-cycles and the seasons of

The lac crop calendar



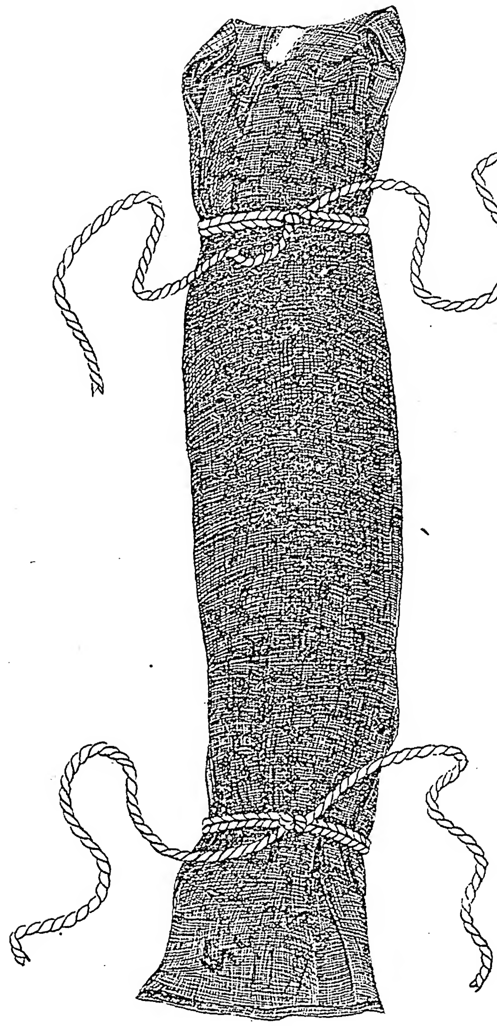
maturity when the crops are harvested differ considerably as seen below:

Strain of lac insect	Name of crop	Duration of life-cycle
Rangeeni	*Baisakhi*	October-November to June-July
	Katki	June-July to October-November
Kusumi	*Aghani*	June-July- to January-February
	Jethwi	January-February to June-July

Another important difference between the *Kusumi* and the *Rangeeni* lacs is that the former is mostly grown on *kusum* (*Schleichera trijuga*) or on a few other plants on which only broodlac from *kusum* is used. The *Rangeeni* lac is grown on hosts other than *kusum* and the brood used for its propagation is neither from *kusum* nor from a progeny of the *kusumi* brood. The more common *Rangeeni* hosts are *palas* and *ber,* which are widely distributed throughout the country. The overall production of *Rangeeni* lac is four to five times that of *Kusumi* because of the limited number and distribution of *kusum* trees. The *Kusumi* lac, however, sells at a higher price on account of the superior quality of its resin.

There are well over a hundred species of trees and shrubs on which lac insects have been recorded in India, but from the point of view of large scale production, only the following constitute important hosts in Northern India.

A sixty-mesh wire-net container (basket) containing broodlac used for infecting palas. *It traps the enemies of lac contained in the broodlac, while permitting a free exit to the lac larvae.*



A wire-gauze broodlac container (basket)

For the Rangeeni strain

Palas; *dhak* (*Butea monosperma* Lamk. Syn. *B. frondosa* Roxb.) : This host plant is common throughout the greater part of India and extends in the N.W. Himalayas as far as Jehlum, ascends the outer Himalayas to about 3,000 ft. and in the hills of southern India to 4,000 ft. It is the commonest lac host and may be utilized in most of the states where it is found.

Ber, beri; *kul* (*Zizyphus jujuba* Lamk.):—Extensively cultivated throughout India, it is one of the major hosts in most of the lac-growing tracts in the country. It is almost the only important host in Murshidabad and Malda districts of West Bengal and in Hoshiarpur district in the Punjab. In districts with severe summer heat, it would be advisable to use it in conjunction with other lac hosts such as *palas* and *Ficus* sp.

Ghont; *kat-ber* (*Zizyphus xylopyra* Willd.) :—It is fairly widely distributed in India, being found in N.W. India, Rajasthan, Uttar Pradesh especially Oudh, Madhya Pradesh and the Western Peninsula from the Konkan southwards. It is an important lac host in Madhya Pra-

Bush cultivation of lac on Flemingia congesta

desh, and has also been successfully employed in parts of Uttar Pradesh and the Punjab. In Chota Nagpur, lac settlements on this host usually result in a failure.

Arhar; *mirimah*; *garomah* (*Cajanus cajan* Linn. Syn. *C. indicus* Sprong) : Extensively cultivated throughout India, it is an important lac host in Assam, particularly in Nowgong, where it is grown as a biennial or triennial crop. In the plains where it is usually an annual crop it would be futile to use it as lac host but improved varieties which would show better growth and longer life in the plains would undoubtedly be worth trying.

Galwang (*Albizzia lucida* Benth.) : It is distributed in the Sub-Himalayan tract from Nepal eastwards, eastern Himalayan valleys up to 2,000 ft., Assam and Chittagong. It is an important lac host in Assam and has given good results in Chota Nagpur also. Often planted outside the natural region, it has been known to grow well in several places in northern India and may be planted for lac cultivation in most places.

Porho (*Ficus cunia* Ham. Syn. *F. conglomerata* Roxb.) : Found throughout the greater part of India, it is common, particularly on the side of ravines. The brood is easily preserved on this host in summer and the yield as well as lac encrustations are satisfactory. Utilized for lac-growing in Chota Nagpur and Assam, it is a host of potential importance for other places also.

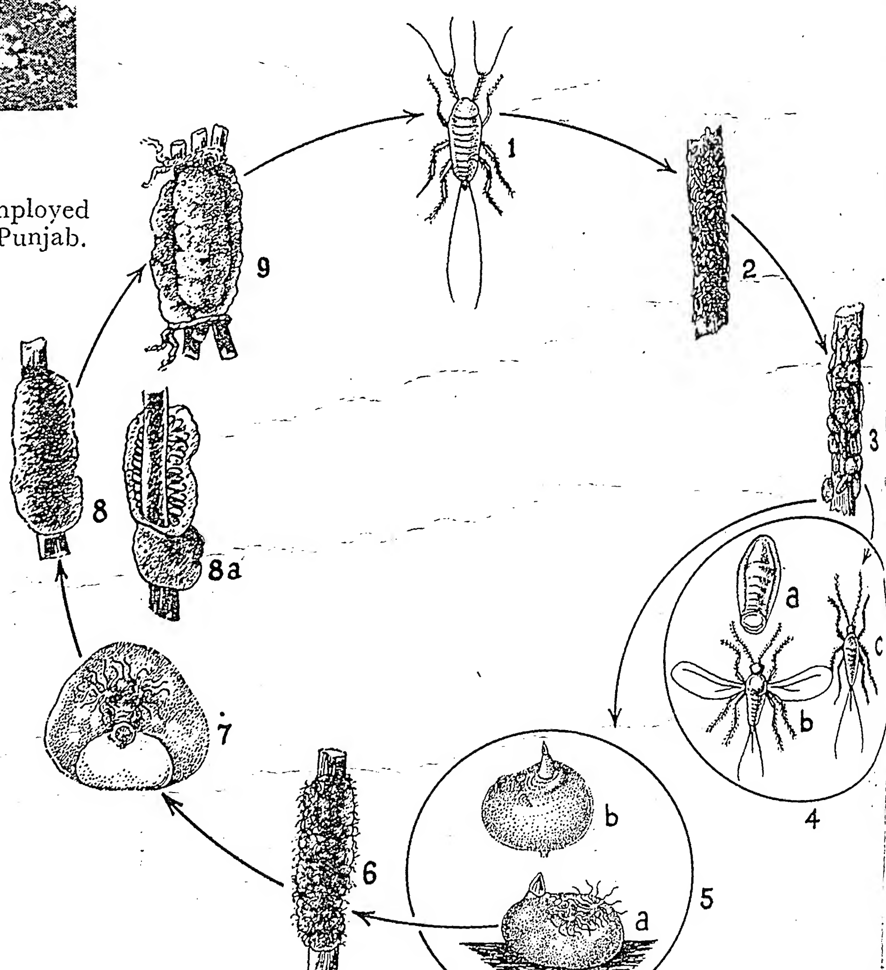
Barh (*F. bengalensis* Linn.) and *Peepal* (*F. religiosa* Linn.) : These occur all over India and are valuable hosts in the hotter parts of the country for their ability to successfully carry the brood through the hot summer.

For Kusumi strain

Kusum (*Sehliechera trijuga* Willd.) This is found in the dry forests of the Sub-Himalayan tract from Sutlej eastwards throughout the central and

LIFE - CYCLE OF THE LAC INSECT

1. *The lac larva*
2. *A settlement of young larvae*
3. *Male and female cells at the time of male emergence*
4. *a-male cell b-winged male c-wingless male*
5. *a-female cell b-female lac insect*
6. *Lac encrustation some time after male emergence*
7. *A female cell showing yellow spot*
8. *A lac-bearing stick with part of encrustation removed (8a)*
9. *Broodlac sticks tied together*



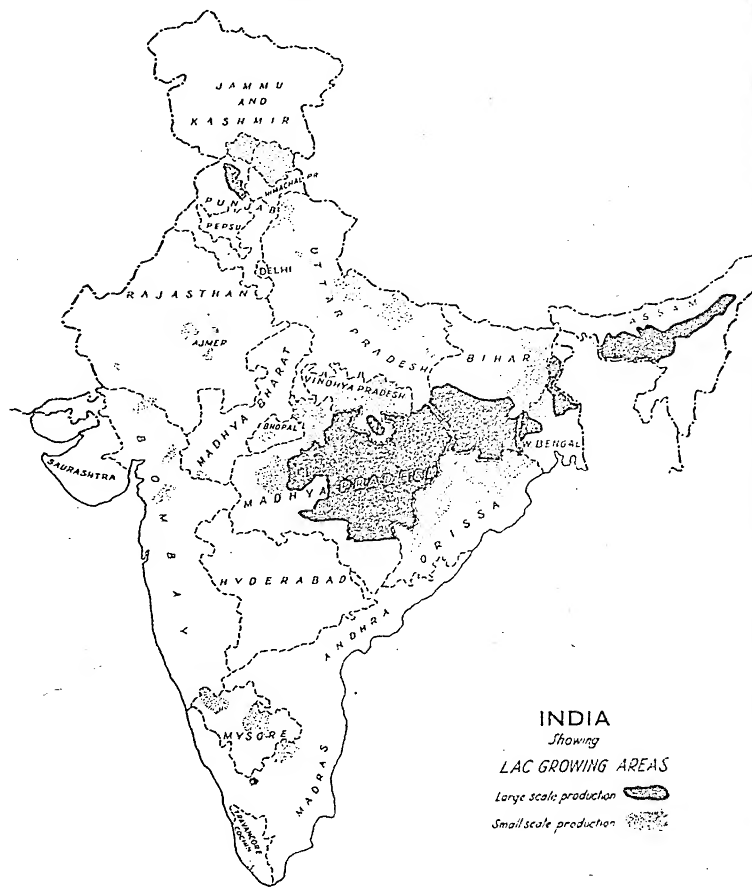
southern India. It is a very important host as almost the entire *Kusumi* lac is obtained from it in Chota Nagpur, Madhya Pradesh, Orissa and parts of Mysore and Madras.

Khair (*Acacia catechu* Willd.) : Common in most parts of India, this host has been used successfully in temperate districts of Chota Nagpur for carrying the *Aghani* crop only. As it cannot carry the *Jethwi* crop successfully because it remains leafless for a considerable period during the summer, it is important that it should occur in company with *kusum* which may be utilized for the *Jethwi* crop.

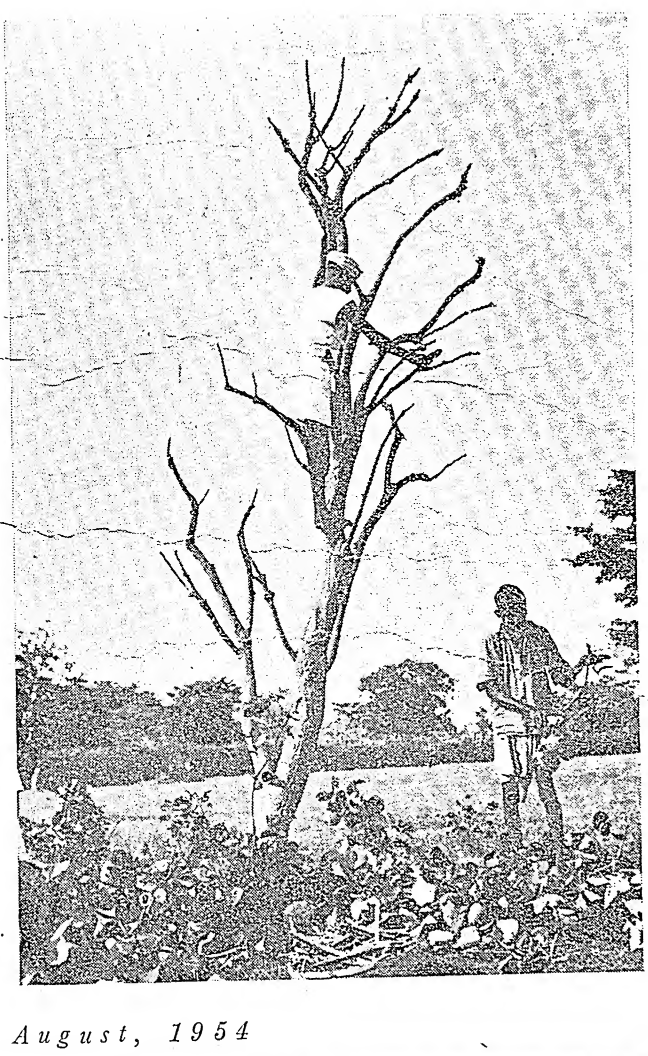
Ber; *beri*, *kul* (*Zizyphus jujuba* Lamk.) : In the event of favourable seasons when excess of broodlac has been produced, the cultivators in Chota Nagpur utilize the brood by infecting it on *ber* which yields a satisfactory crop for a season or so. However, it is generally advised that *ber* should not be brought under a *Kusumi* crop except under the fore-mentioned circumstances.

Since different hosts react differently to weather conditions, the broodlac survives better on some species than on others. This is especially true of hosts usually

Lac-growing areas in India



A palas *tree being cropped and the lac-bearing sticks being collected in a basket*



employed for the *Rangeeni* strain and the years of a very hot summer. In order to ensure a steady supply of broodlac it is advisable to have a larger variety of trees under lac than to restrict cultivation on one kind of host because if the latter gets adversely affected during a particular summer, a widespread shortage of broodlac may occur. Such a situation periodically arises in Murshidabad and Malda districts of West Bengal where *ber* is practically the only species put under lac.

A plant under lac suffers from the drain upon its sap caused by the millions of lac insects settled on its branches. As the branches are cut at the time of cropping, the plant receives a further set-back. Hence if the same tree is continuously kept under lac, its vitality would suffer and the resulting crops would become poorer in the succeeding seasons. For this reason it is important that such plants should be given periodic rest between cropping and the next infection. This may be achieved by dividing the available number of lac hosts into blocks or coupes, the size and number of which would depend upon the kind of plants or trees and the nature of the strain of the lac insect employed. Each coupe is then brought under lac periodically.

A *kusum* tree being slow-growing, may normally be brought under lac after an interval of $1\frac{1}{2}$ years, during which period it is able to put forth suitable shoots in sufficient numbers for yielding a satisfactory crop. As the crop lasts for about six months, the *kusum* trees are divided equally into four coupes. Each coupe would thus yield a crop after every two years.

A woman carrying cropped lac-bearing sticks collected in a basket

In the case of *palas* and *ber* and most other *Rangeeni* hosts the total number of trees are divided into three coupes in the ratio of 1 :3 :3. The smaller coupe, which may be located more centrally for convenience of operations, is employed for growing the *Katki* crop only. It is infected each year in June-July and cropped in October-November, depending upon the locality. The other two coupes are utilized for growing the *Baisakhi* crop, only one of these being put under lac in each alternate year.

A *Baisakhi* coupe is infected in October-November and the crop matures in the following June-July, i.e., after about nine months. From these coupes the crop is usually partially harvested : shoots that are covered with dead lac (often caused by excessive heat) and shoots that are encrusted with living lac insects are cut and removed from the trees, and the sparse settlements of insects on the rest of the shoots allowed to remain as such. Swarming of the lac larvae would then take place *in situ* and result in a small *Katki* crop. The dead lac referred to above is scraped and the sticks with good encrustations of living lac insects are used as broodlac for infecting the *Katki* coupe.

However, in localities where the summer is excessively hot or of long duration, instead of the three coupes mentioned above only two coupes having equal number of trees may be had. Each year a coupe may be used alternately to grow the *Baisakhi* crop by artificial and the *Katki* by self-infection.

Lac insects do not thrive on old and woody shoots and if a tree has large proportion of such shoots, it would be necessary to prune it at a certain period before it is infected with lac. Judicious pruning of a tree would induce the growth of suitable number and size of shoots. If pruning is done at proper intervals it would also help in maintaining the general health and growth of the trees.

The time of pruning for different crops in the case of the common hosts is given below. Since local conditions exercise considerable influence on the growth of a tree, it may be found necessary, after some experience, to modify these timings to suit a particular locality. Cropping of a tree at the time of harvesting lac could also serve the purpose of pruning provided the trees are able to produce sufficient number of infectable shoots by the next infection. In the case of *kusum* and certain *Ficus* species, cropping usually serves the purpose of pruning.

Host trees	**Crop for which pruning is done**	**Approximate time of pruning**
Palas	*Katki*	Early to mid-February
,,	*Baisakhi*	Early to mid-April
Ber	*Katki*	Early to mid-February
,,	*Baisakhi*	Early to mid-April
Kusum	*Aghani*	January-February ($1\frac{1}{2}$ years prior to infection)
,,	*Jethwi*	June-July ($1\frac{1}{2}$ years prior to infection)

While pruning or cropping a tree, it would be found helpful to bear in mind the following points. The overall consideration should be that the general health of the tree must be maintained and its frame allowed to increase as far as possible. All the dead and diseased branches should be carefully cut off. Cutting of other branches too should be done in such a way as to maintain a good shape of the crown and to allow plenty of room for the growth of new shoots.

Branches over two inches in diameter should not be cut, though generally good results are obtained by cutting at the thickness of $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches. Thicker branches may, however, be cut in case of old trees when it is desired to produce new shoots at the expense of the old or to keep the frame of the tree within reach for convenience of operations. Shoots under $\frac{3}{4}$ inch should be flush-cut at their base, i.e., close to the branch from which they arise. In all cases the cuts should be neat and should cause the least injury to the bark. This could be more easily attained if the implements used are sharp.

When pruning or cropping trees which have previously been pruned or cropped, the cuts should be made on the new wood resulting from the last pruning or cropping. The new shoots may be cut at a length of $1\frac{1}{2}$ feet from the point of its growth, provided it is of a satisfactory thickness. This practice will allow a steady increase in the frame

of the tree. Where the hand cannot reach for cutting a branch at the desired place, a standard tree pruner may be used. A secateur (roll-cut type) would be found convenient for cutting thinner shoots while a country *dauly* (crooked knife) would be useful for cutting thicker shoots or dead stumps.

The method by which the lac insects are introduced on to a host plant is called infection or inoculation. The plants to be infected should possess sufficient numbers of infectable shoots and a cultivator must exercise his own judgement in leaving a tree uninfected, if in spite of earlier pruning, there is an insufficient number of shoots and if the shoots are of poor growth.

The quality of broodlac to be used in infection is of prime importance. Broodlac should be cut off the tree at the proper time, i.e., some time before the swarming of larvae is due to take place. This could be recognized visually by the appearance of a yellow spot on the crown portion of a healthy lac cell. The broodlac should contain mostly healthy gravid females and fairly good lac encrustations, and should be free from any conspicuous signs of attack by the predatory enemies like *Eublemma amabilis* Moor or *Nolcocera pulverea* Meyrick.

The caterpillars of these moths tunnel through and eat away the lac encrustations as well as the lac insects, causing considerable damage to the crop. The former build galleries and domes with silk and roundish discs (its excreta) while the latter can be recognized by irregular web studded with small bits of excreta.

A kusum *branch bearing lac encrustations. Best quality lac is produced on* kusum

There are several other insects, like small wasps which are enemies of lac or of lac predators and are commonly found in most lac-growing areas. Where possible, and especially in areas where cultivation is being extended or introduced for the first time, 60-mesh wire-baskets, $2\frac{3}{4}$ inches wide and $11\frac{3}{4}$ inches long may be used as broodlac containers for infection purposes. These would permit a free exit to the lac larvae and trap the enemy and other insects associated with lac, and thus help in a better growth of lac crop in the beginning of the extension work.

Ordinarily, however, broodlac is not put in baskets but is tied in small bundles and infected on the trees by tying them along the longitudinal axis of the branches bearing infectable shoots.

The quantity of broodlac required by a tree would depend upon the kind of tree and the size and number of infectable branches present on it. A medium sized *palas* or *ber* tree may require about a seer of broodlac while a *kusum* tree would need double that quantity. Over-infection should be avoided by carefully watching the progress of swarming and settlement of lac larvae.

In order to have a uniform infection on a tree, it may be necessary to transfer brood bundles during the course of infection from one branch to another or from one tree to another. When the emergence of larvae is nearly over, the broodlac should be promptly removed; usually a period of three weeks would be found enough for the purpose of infection.

The enemies of lac insects emerge in larger proportions as the emergence of lac larvae comes to an end. The leaving of broodlac on trees after the emergence of lac larvae is over would encourage the spread of lac enemies to the detriment of the lac crop.

Self-infection or natural infection of a tree (i.e., instead of removing mature lac from the tree, part or whole of it is allowed to remain on the tree to swarm there) should for that reason be avoided except where absolutely necessary.

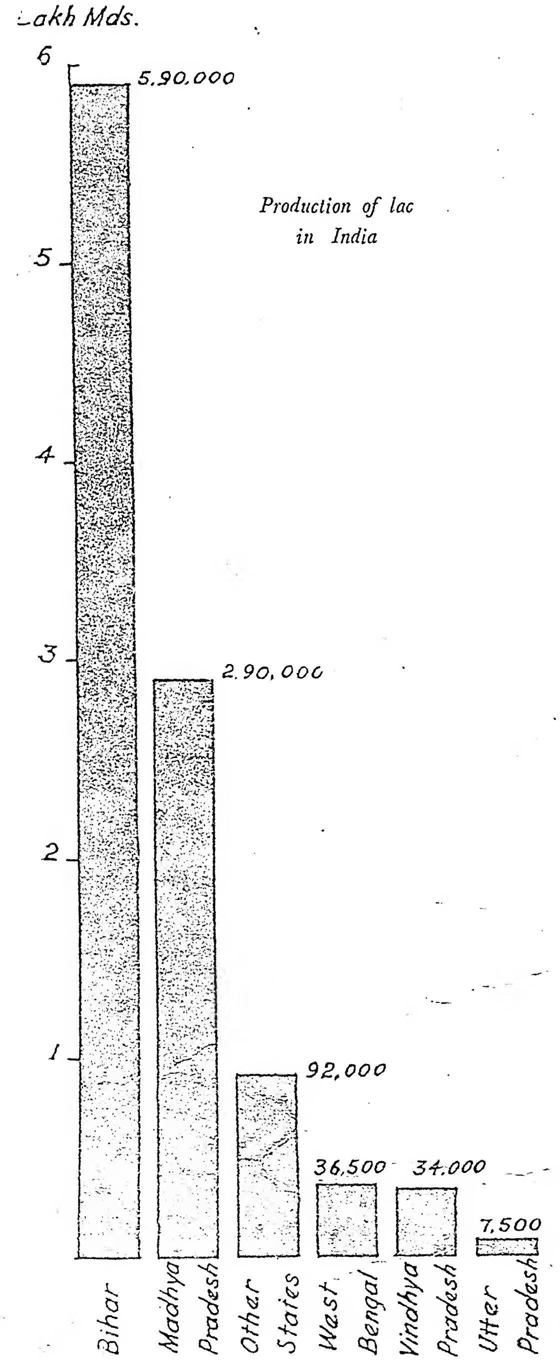
The foregoing remarks on couping, pruning, etc., apply mainly to lac cultivation on such hosts as would generally grow into trees. But lac is also cultivated on certain other plants and bushes, mostly in Assam.

In Nowgong, *arhar* seeds are sown in March-April and the resulting plants inoculated in October-November. In May-June, lac encrustations are broken or removed with hands from the healthiest plants leaving sufficient amount for self-infection. Plants with poorer growth are generally uprooted. The next crop is harvested in October-November and a similar procedure followed. The final or the third crop is taken in the following May-June.

Grewia multiflora, Leea robusta, L. cripa and *Flemingia congesta*, all of which grow into shrubs or bushes, are used mostly for growing the *Katki* (*Katrian*) crop with brood from *arhar* or *Ficus* species and yield heavily under local conditions. Annual shoots from a perennial stock are again utilized for the same purpose.

Mention may also be made of the preliminary trials to grow *Albizzia lucida* in the form of a bush in small beds which were well-manured and watered at Namkum. The growth of shoots was rapid and the plants were infected after they were about 1½ years old in the month of October. The resulting *Baisakhi* crop was very satisfactory in yield of scraped lac as well as of broodlac. As this species retains a fairly dense foliage during the severe summer months, the broodlac was better preserved on it than was the case on *palas* or *ber*. The *lucida* plants coppice well and throw out sufficient number of shoots which could be infected after a suitable interval.

Much harm is done to lac crops by the practice of harvesting them prematurely. This practice, commonly called *ari*-cutting, is unfortunately widely prevalent



Production of lac in India

for the *Baisakhi* crop. While there may be no objection to the removal of branches bearing dead encrustations of lac in April or a little later, the removal of branches with immature living insects at this time will not only reduce the overall yield of sticklac, but often result in shortage of broodlac in June-July which, as far as possible, should be regarded as the right time for harvesting the *Baisakhi* crop. The same remarks apply to the other crops also which should be cut when the insects are mature.

Broodlac sells at a much higher rate, and every cultivator should attempt to sell as much of it as possible and hesitate to cut *ari*-lac. Care should, however, be exercised not to cut the broodlac long before or after the emergence of lac larvae. The visual method for determining the right time for cutting the broodlac is quite helpful. As the time of maturity approaches one might look for the yellow spot that appears on the lac cell near the anal pore. The appearance of the yellow spot is caused by the fact that as the female approaches maturity its body contracts near the anal region and vacates a portion of the cell causing it to look yellow (eggs are laid in this part of the cell). When the yellow spot occupies nearly one-fifth to one-fourth of the crown or top area of the cell, the lac should be cut, for within about five days from this time the emergence of young ones will begin. Within these days, the broodlac may be sold or despatched to outside stations.

The transport of broodlac also deserves a special mention. As far as possible, strong bamboo baskets, preferably round, with a capacity to hold 15 to 20 seers of broodlac, should be employed. The lid should also be made of bamboo. Broodlac should not be despatched or kept in gunny bags as the heat generated by the insects is likely to make the inside atmosphere stuffy, induce growth of moulds and kill most of the gravid females as well as the larvae. For air-transport, however, rectangular bamboo baskets strengthened by light wooden batton frame, 2 feet × 1½ feet × 1 foot, should be found more satisfactory.

Scraping of lac off the twigs can be commenced immediately after cropping; while doing so care should be taken to kill all the pupae and caterpillars of moth enemies. The scraped or sticklac obtained from a crop should be spread thinly in a shaded and well-ventilated place, as otherwise, moisture and heat from the insects themselves would induce fungus growth and permit blocking of lac, conditions which will reduce the value of the commodity in the market. Bits of wood and other admixtures should be removed. Storage of lac for long would reduce its quality and might, if proper precautions are not taken, invite attack from pests. The cleared scraped lac should be marketed as early as possible.

Indian Farming

VOL. IV SEPTEMBER 1954 No. 6

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NEW DELHI

PLANT PROTECTION

PRODUCTIVE FARMING requires that adequate attention be paid to the protection of crops from the depredations of wild animals, pests and diseases of various kinds. It is common experience that the farmer does not reap the benefit of the toil he puts in in crop husbandry fully due to the 'untaken harvests.' In fact, the loss caused to the nation's agricultural income every year amounts to a colossal figure. What this means to a nation hard-pressed to make production meet demand can easily be imagined. With the stress these days on intensified farming, the problem of plant protection assumes new importance. In the case of the coconut, for example, it is estimated that the leaf-rot disease alone, which is widely prevalent in Travancore-Cochin, is responsible for a reduction of anything between 10 and 80 per cent in the yield. There was a time, of course, when the farmer used to helplessly witness the devastation caused to his crop by pest or disease. But the farmer of today is in a much happier position because of the vast amount of research that has been done in the field of plant protection in the last many years. A number of chemicals are now available to him which make fighting diseases and pests easier, cheaper and effective. The Extension system is also working on a better footing and newer methods of plant protection are more quickly conveyed from the laboratory to the field and the necessary chemicals made available to farmers in sufficient quantities and in time. However, apart from conveying information on the measures required to keep the crops safe from pests and diseases to the farmers scattered over the vast country, another aspect of this all important work requires to be stressed. Plant protection work, if it has to be successful, requires vigilance and immediate action on the part not of one farmer or two in the village but the entire farming community. The adoption of control measures to safeguard crops against pests and diseases, however efficiently done by a few enlightened farmers, will bring no effective results if the rest in the village are indifferent to the work. As in other fields of rural development and better farming, the keen sense of co-operation on the part of every farmer is what is needed to reduce pest or disease damage to the minimum. Community action in this regard will also solve such other problems in plant protection as the procurement and distribution of chemicals and the apparatus needed, and assure timely action on all the farms in the village whenever a pest or disease makes its appearance. A healthy crop not only means more food for the people or more raw material for the industries but also more money for the farmer. As such, fighting pests and diseases is a work of national importance calling forth concerted action on the part of the entire farming community.

OUR COVER

Mucuna, the new legume that was tried as a green fodder crop at the Indian Agricultural Research Institute, New Delhi. Picture shows the excellent stand of mucuna grown mixed with maize. For further details about this new fodder crop see article on page 16

Farmers I Have Met

HE LIVES WITH PLANTS

"NURSERY-KEEPING is a paying profession provided you can understand the 'language' of the plants to give them proper care", said Shri Babu Ram, a 25-year old nursery-keeper of New Delhi, to me when I met him about a month back. I was a bit puzzled by this statement at first, but as I talked further to the youngman I could easily guess what he really meant.

Shri Babu Ram was initiated into the art of nursery-keeping by this father at an early age of 16, and given intensive "schooling" for about six years. The boy picked up the art very well, so much so that for the last three years he has been managing the nursery known as "Chimmanlal & Sons" independently and in a creditable manner.

Shri Babu Ram, who grows all varieties of fruit, flower and vegetable plants, lives in the nursery all the 24 hours of the day. He attends to the needs of the plants himself with the assistance of one servant. As he puts it, "I have to look after so many families that I hardly have any time to do anything else. On top of it, my 'wards' cannot speak; so I have to judge their requirements myself and satisfy these at the proper time. This keeps them living, happy and cheerful, as you can yourself see from these smiling flowers around here."

Shri Babu Ram further told me that he took special care to protect the plants from the intense tropical heat to prevent them from withering away prematurely. For this he uses leaf-compost mixed with a little sand, as, according to him, it keeps the plants cool and refreshed. Besides, "it is always good to use leaf-compost for manuring the plants as unlike cow-dung compost, it saves the plants from mite and other insect-attacks." He added proudly that so far no outbreak of pests had occurred in his nursery and he had not spent a pie on any kind of insecticide.

Shri Babu Ram carries an old head on young shoulders and discusses all aspects of nursery-keeping with confidence. He has not betrayed the confidence placed in him by his father three years ago when the latter entrusted a well-established nursery with a sizable clientele to the independent care of young Babu.

—H.K.S.

Man of the Month

Shri Yashwantrao Sawant

"DO you think that a farmer can upgrade sugarcane production and maintain it at an economic level without investing heavily on the crop ?" was the question I posed to the District Agricultural Officer of the Poona district in Bombay State in June last.

He wrote back: "This is not just a possibility. Many farmers are already doing it. I could name a dozen of them off-hand. If you want to meet one of them and get the answer for your question straight from him, I would suggest Shri Yashwantrao Sawant of Koregaonmul near here."

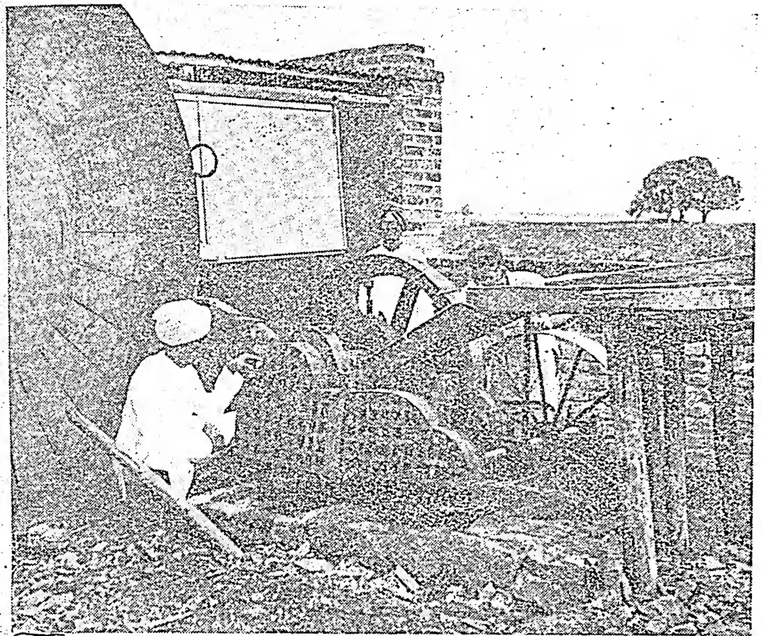
This is how I met Yashwantrao Bajirao Sawant at his farm-home in Koregaonmul, 17 miles from Poona on the Poona-Sholapur Road. With him was his educated son Narsing who is helping his father, along with his two brothers, manage the 125-acre farm.

As we went round the farm, I was struck with the neatly laid out bunds and irrigation channels through which water was flowing to the sugarcane and vegetable fields.

The Farmer
WHO HAS "NOTHING TO GRUMBLE" ABOUT SUGARCANE

by
M. G. Kamath

Farmer Yashwantrao Sawant supervises the irrigation of his sugarcane crop. Personal supervision, he says, pays dividends in agriculture



One of the two Kirloskar crushers on the Sawant farm. Father and son checking up the crusher before the gur-making season starts

Yashwantrao is the fifth generation of Sawants living and farming on this holding. Till five years ago, the farmer told me, he was doing what his forefathers did before him—farming the traditional way. It was about five years ago that he realised that it was time he thought of getting science help better land use, and sought the help of the Agricultural Department.

I asked Yashwantrao what improved measures advocated by the Agricultural Department he was adopting.

"Quite a number of them," he said. "To mention the most important ones, I have been using improved seeds for all crops including potatoes ; I have been relying on the use of oil-cakes, manure mixture, ammonium sulphate and the special potato mixture for raising better crops on the farm ; compost-making, taught to me just a few years ago, has solved to a large part the procurement of enough organic manures for the various crops I raise here. Spraying and dusting for insect pests and diseases as shown to me by the Agricultural Officer has been a boon to me."

"Not to mention the mould-board ploughs, the power-driven cane crushers and the oil pumps installed on our wells," added Narsing, obviously the one more interested in the mechanical aspect of farming. A jeep and trailer were doing a lot of work for Narsing and his father in transporting farm requisites and farm produce.

Yashwantrao's farm extends to an area of 125 acres—a medium black and not too deep soil. With seven wells and just about seven to eight inches of rain in the last few years, he has been able to irrigate 70 acres of the farm. I admired Yashwantrao for the ingenious way in which he was managing these acres. He had split this acreage into four blocks putting three of his sons incharge of three blocks (the fourth one is in the College), and his brother in charge of fourth. While each one was responsible for all the operations on his own block, the farmer would take a round each day of all the blocks and discuss the problems that each one would have and suggest a way out for them. "This method", he said, "is working very fine indeed. It gives each of my managers the responsibility and training desired to bring out the maximum out of land."

Of the crops grown, sugarcane occupied 25 acres. On the rest of the land such crops as *bajra*, *jowar*, gram, chillies, potatoes, vegetables, wheat, peas and paddy were raised. A two-acre plot was reserved for raising paddy for home use and a ten-acre orchard was devoted to the growing of lemons.

Narsing and father discuss a problem. The system of management in blocks, according to Sawant, has made his work lighter while giving the requisite responsibility and training to the four managers

I saw the sugarcane fields lush with second and third year ratoons the farmer was raising and asked him the question that was topmost in my mind.

"Tell me," I said, "how do you raise sugarcane the economic way?" The farmer began: "I plant cane from November to January. By way of preparatory cultivation, I give the field three ploughings with Kirloskar No. 9 plough (a heavy plough) with an interval of 15 days between two. Then I manure the field with farmyard manure or compost at 60 to 80 cartloads per acre."

"Have you tried raising green manures?" I interrupted.

"Yes", he replied. "In fact, when ratooning is not done, I get about six acres of land for raising sannhemp which I utilise for green manuring sugarcane. When I am short of farmyard manure I also try sheep penning. I put 500 goats or sheep in two *gunthas* for two nights. I get about 200 cartloads of compost on my farm. I resort to cattle penning also when I find manure shortage.

"To continue, I give one more ploughing after the application of bulky manures to the field, then plank it to crush clods; then I make the furrows, again with Kirloskar No. 9, 13 inches deep and about three feet apart.

"For planting I use $1\frac{1}{2}$ ft. long sets and with three buds on each."

"What about seed treatment?" I said.

"I used to do that once", was his rejoinder, "but we are now lucky in not having any diseases in recent years. As such I have not been treating the seed before sowing."

VARIETY USED

"What is the variety you like most?" I asked.

"Till 1935", he replied, "we did not grow any variety excepting the local *Pundya*. Then Co. 419 was introduced to us. It was better than *Pundya* in general yield as well as quality and in the keeping quality of the *gur* prepared from it. But since the last two years we have been using Co. 475 as recommended by the Agricultural Department. This variety has become very popular in this area and has practically replaced Co. 475."

"You think you have done well in substituting Co. 475 for Co. 419?" I asked.

"So far", said the farmer, "Co. 419 has given us a good performance. Co. 419 is a class of its own. It requires less of irrigation water and can stand droughty conditions somewhat. Co. 475 takes more water, lodges to a greater extent and, they say, is susceptible to disease, but if it is free of red rot, it produces thicker canes and gives more yield. I certainly fancy Co. 475," he said.

"Do you think that growing a sugarcane variety year after year from the farm seed leads to a deterioration in yield?" was my next question.

"That is what my experience is", he said "and to get over that I have been always getting some fresh seed from the Padegaon Sugarcane Station and multiplying it here so that I may keep up the freshness of the seed material. I believe every sugarcane farmer should do that as a step towards maintaining pretty good yields."

After the planting of the cane is over, he converts the ridges and furrows into beds of 12 ft. × 12 ft. to facilitate irrigation.

"What about artificials? Don't you apply any artificials at planting time?" I asked.

"No," he said, "I do not fertilize at planting time, but I give 100 lb. of nitrogen in the form of ammonium sulphate two months after planting and another dose of 100 lb. of nitrogen in the form of oil-cake after two months and earth up the crop." The maximum dose of nitrogen prescribed by the State Department is 300 lb. for the crop.

The crop gets three weedings in all up to June, and irrigation once in ten days in winter and once a week in summer, bringing the total to 35.

HIGH YIELD

With this attention to the crop and the personal supervision of farmer Yashwantrao, a constant yield of about 60 tons per acre was being obtained by him.

"What do you think are the more important factors that lead to good cane production?" I put in.

"Water and manure", was his quick rejoinder. "If I had the benefit of canal water, I am confident I would double the yields. Just now I have to confine my acreage under sugarcane to just 25 acres for want of enough water," he said.

"Talking of ratoons, what is your experience?" I asked.

"That brings us back to the varieties," he replied. "A Co. 419 ratoon, from my experience, is better than that of Co. 475, and again Co. 419 was giving me three ratoons while Co. 475 gives me only two." Raising a ratoon crop is less costly according to the farmer.

"After following the better way of cultivating sugarcane, how do you think you stand regarding yield?" I enquired.

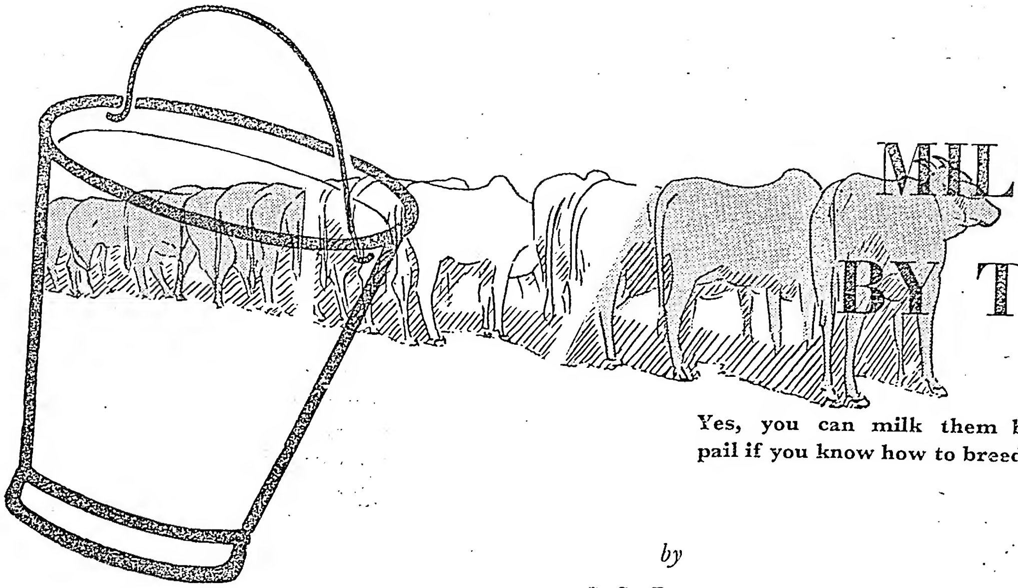
"Before I took up these improvements, my yield of cane was roundabout 40 tons to the acre. Now it is a constant 60 or thereabouts. Farmers here who are still to follow better methods are finding that to get anything more than 40 is an uphill task."

The farmer was converting cane into *gur* and marketing it. The power-crushers he had installed on the farm were of great help to him in reducing the cost of *gur* production.

SMALL DAIRY

I was wondering whether with such diversified crops and improved methods on the farm, the farmer would not also think of trying mixed farming here. To my question whether the farmer was also maintaining a dairy herd, he led me to the cattle sheds which were maintained very clean. Apart from the 24 work bullocks the farmer owned, he is also maintaining 12 cows and 12 she-buffaloes as a small dairy unit. He told me that he was able to maintain the herd without much trouble. Twenty-five acres on his farm had been maintained as pasture land for the grazing of the cows. He also showed me his excellent Gir breeding bull.

(Continued on page 8)



MILK THEM BY THE PAIL

Yes, you can milk them by the pail if you know how to breed them

by

S. S. Prabhu

JUST NOW, milking the cows by the pail is nowhere common in our country, in spite of the admittedly imposing numbers of cattle we have. In fact, our average milk-yield is one of the lowest among world averages. Actually, it works out to about 400 lb. per lactation of 300 days, as against 10 to 20 times this quantity for European cattle.

How do we step up milk production so as to meet the country's requirements without further increasing the cattle population? Some say the solution lies in proper feeding. Others hold that control of cattle diseases can do the trick.

Proper feeding and disease control can facilitate the free expression of the milk-producing trait of the cow, but they cannot bring out milk if it is not there. To maximise yields, it is necessary first to produce cows with high milk-yielding potentialities. In other words, we must breed for plenty of milk.

For adopting a sound breeding programme, one pre-requisite that has to be satisfied is the ready availability of standard breeds with satisfactory performances. Fortunately, we have in Sahiwal, Sindhi, Gir, Tharparkar, Ongole and others excellent breeds to transmit the high milk-yielding property to the low-yielding nondescript cattle that form the majority of our cattle population.

GRADING

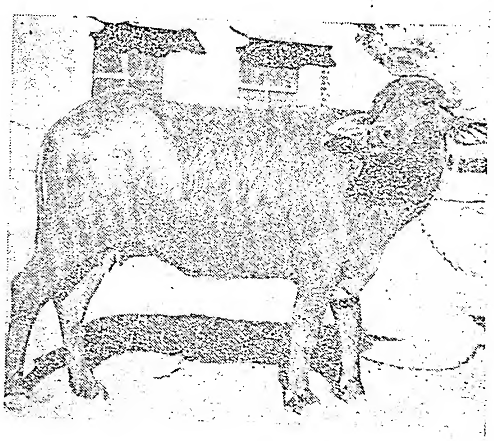
How then is breeding for milk done? One way is by grading the cattle. This is done by systematically replacing the low-milking capacity of the nondescript cattle stock by the higher milking qualities of the standard breeds. For this purpose, the nondescript cattle are crossed, generation after generation, by the bulls of the standard breeds. When this process has been followed for five or six generations, the resulting progeny approach in excellence the performance of the superior breed used in grading.

We have two cows, a mother and a daughter. The nondescript mother never gave more than two seers of milk per day at the peak of her lactation, while the daughter gave as much as eight seers of milk per day. The former has never been economic, while the latter is. What brought about the difference was that the daughter was born to a Sahiwal bull.

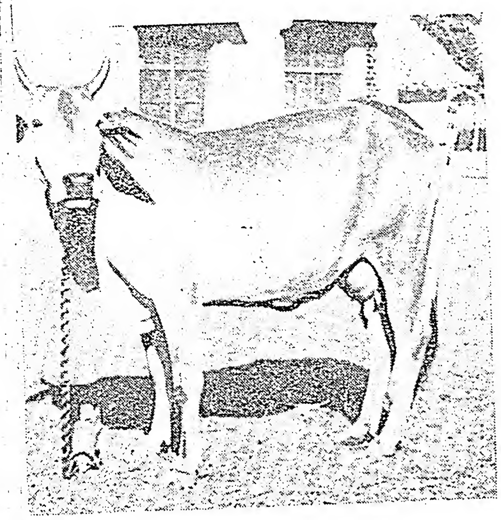
In a like manner, the daughter of a country she-buffalo born to a Murrah bull gave, in her very first lactation, three times the milk ever given in a day by the mother.

SELECTIVE BREEDING

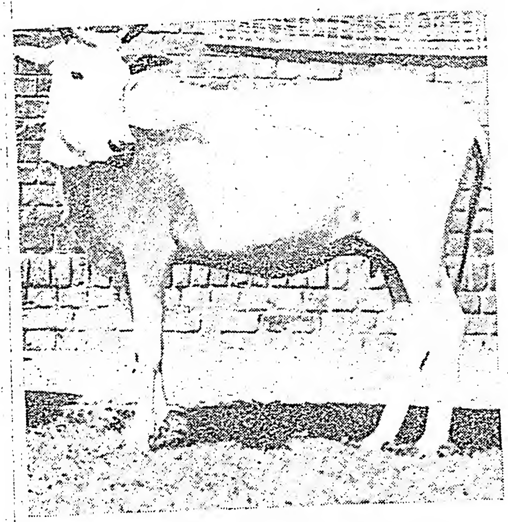
The other method of achieving the same result is by selective breeding. It means mating the best to the best. It is laborious and time-consuming. Both the bull and the cow have to be selected. It is not very easy to estimate the bull's worth, and a chance selection of a wrong bull may at times ruin years of patient and hard work. This kind of work, though it requires



The buffalo that gave three times the milk ever given by her nondescript mother, was born of a good Murrah bull



This is the mother that never gave more than two seers of milk per day



The daughter which gave eight seers of milk per day because of her being born of a Sahiwal bull

expert supervision, is nevertheless a safe process of improving standard cattle breeds.

It, therefore, looks as if the cattle situation at the present time can best be tackled by grading to begin with. Grading to be successful, however, requires that the standard breeds used be carefully selected. Again, for successful grading we have to ensure that the bulls of select breeds are available in sufficient numbers and at specified intervals over a period, say, of 25 years as the grading programme gets going and gathers momentum.

As the ceiling value of milk-production in graded stock increases, we will have to maintain and further improve that level. It will be necessary to produce bulls having the desired levels of transmitting abilities for milk. This can be done through selective breeding of the breeds selected.

Grading thus depends upon improvements in the selected breeds, and this is done through selective breeding. Grading, therefore, cannot be divorced from selective breeding, and to ensure a smooth execution of any grading programme, it will be necessary to multiply the number of farms keeping only pure stocks of the superior breeds.

At one time, the job of finding the large number of desired bulls for undertaking this type of breeding work would have sounded impossible. Today, thanks to the technique of artificial insemination, we no longer face such a situation.

(Continued from page 6)

"My idea is to build up a small Gir herd," he said. And a look at the herd showed how good the results of his attempts in this direction were.

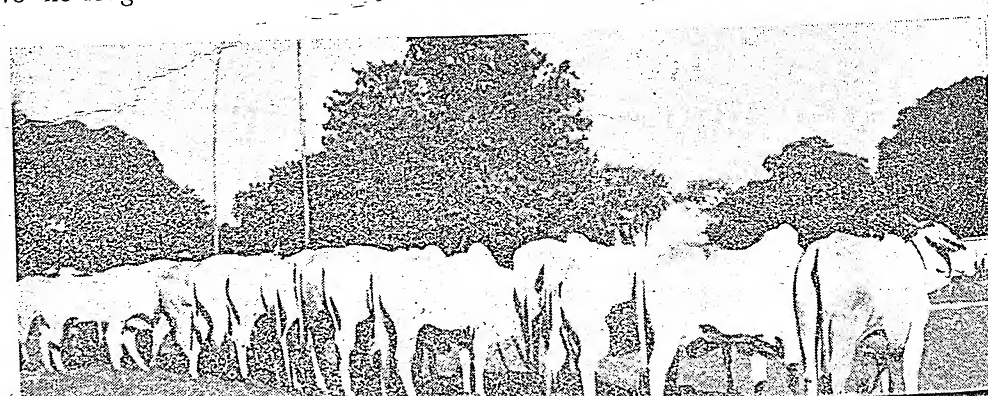
"Heard of the Japanese system of cultivating paddy?" I asked.

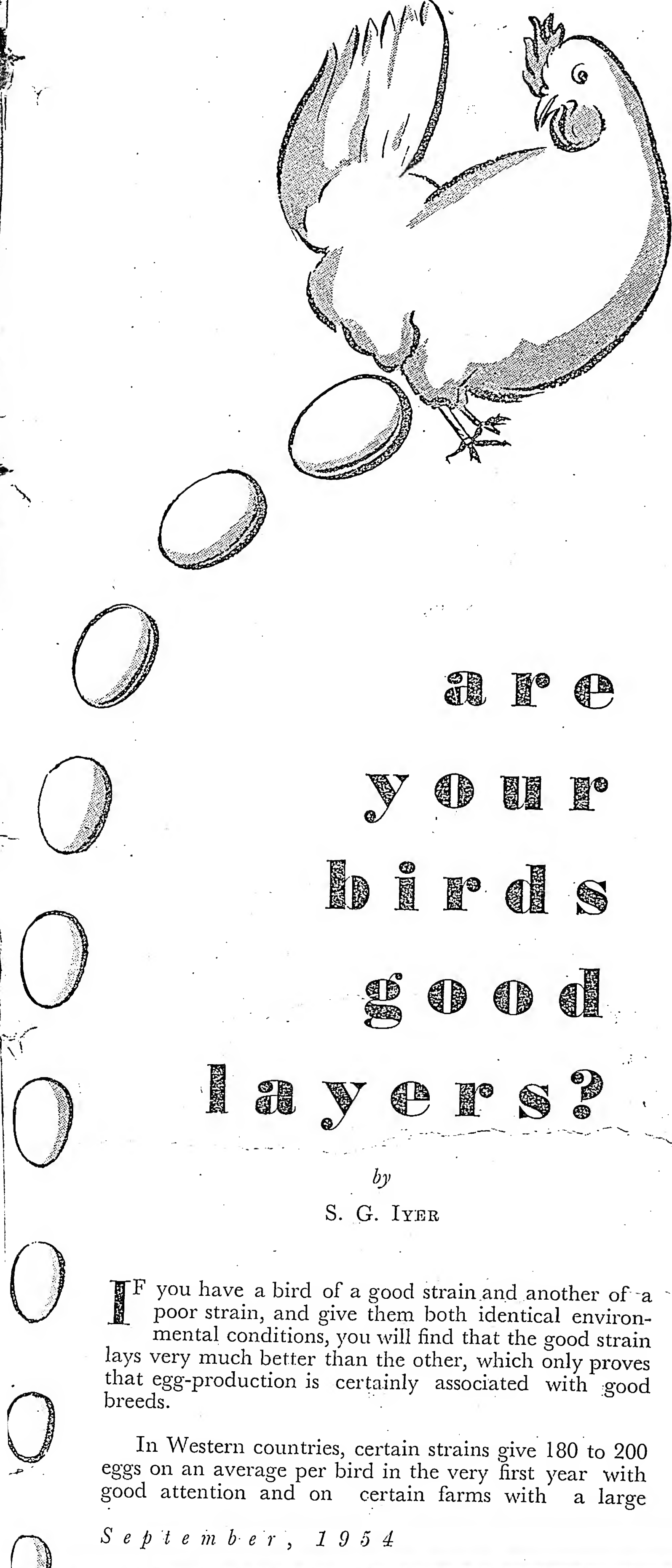
He smiled and said, "Heard of it? I have not only tried it but am telling others now that they should adopt it. To tell you the truth, my trying the new system was nothing spectacular because I grow just two acres of paddy. But till last year, when I used to raise paddy in the usual way, my yield never used to exceed 40 maunds an acre. With the Japanese system, to my surprise, and to every body else's also, I got just twice my usual yield. Not only that. I was using 64 lb. of seed for my nursery per acre, but by the Japanese system I found that 15 lb. was ample."

As if to give a final and conclusive reply to the question that I had asked him when I met him at the farm gate, he said, "there are a number of farmers who are yet to adopt improved practices and get better returns for their labour. I have been growing sugarcane on these 25 good acres with these practices I have been telling you about, and have nothing to grumble about the yield. I wish other farmers also put in a little more effort in raising their cane yields."

As I thanked and left him, I saw him going back to the fields where water was being let in for his favourite crop of sugarcane to supervise the work so that the water could properly seep into the soil and nourish the crop, about which, as he had said, he had nothing to grumble.

The herd of fine Hariana cows produced at Izatnagar. The herd was built up by selective breeding





are your birds good layers?

A factor that can easily decide whether or not you get paid for all the troubles you take in poultry-keeping

by

S. G. Iyer

If you have a bird of a good strain and another of a poor strain, and give them both identical environmental conditions, you will find that the good strain lays very much better than the other, which only proves that egg-production is certainly associated with good breeds.

In Western countries, certain strains give 180 to 200 eggs on an average per bird in the very first year with good attention and on certain farms with a large number of birds an average of over 200 eggs per bird has been obtained.

Several factors determine egg-production. From the practical point of view, the earlier a pullet lays, the greater the financial gain. Again, the birds that begin laying early are generally very much better than those that begin laying late.

Good nutrition and proper management help early laying. The season also plays an important part on the laying time of the birds. Birds hatched from November to February or March begin producing at an earlier age than those hatched from March onwards. Birds hatched early in the season come into lay at a lighter body weight than late-hatched birds. This is no cause for alarm, because eventually these birds attain as big a body weight as late-hatched birds. However, during the first year, the egg-weight will be less than that of the late-hatched birds.

The date of hatching also affects the number of eggs laid in the first year. If hatched very early, such birds are apt to go into a complete or partial moult and so pause or rest for six to twelve weeks. The best production during the first year is obtained by hatching so that the birds come into production by about the end of September.

SEASONAL EFFECTS

The number of eggs laid per month is very much affected by the season. Birds normally lay most intensively during the spring months. However, in countries where the climate is equable during the whole year, there is much less variation in the rate of production.

A poor egg-layer may lay only one egg in two or three days or even a longer period. On the other hand, a good laying bird will lay the first egg fairly early in the morning and lay the next egg at the same time or a few minutes later next day and so on until she lays an egg fairly late in the evening. She will then miss a day and start the cycle all over again. In other words, good layers lay in long "clutches" with short intervals and poor layers in short "clutches" with numerous long or short pauses.

Birds that lay a large number of eggs during the winter months are on an average better layers than those that lay a few eggs during the period. Further,

birds hatched in January to March and coming into production from the end of September are better layers if they do not have what is called a winter pause.

BROODINESS

Prolonged periods of broodiness lower annual production. *Desi* fowls are very prone to broodiness and naturally the production will be very small, but by checking the broodiness the average annual egg-production can materially be improved. Light breeds such as Leghorns are as a class very much less subject to broodiness than heavy breeds. Persistently following a policy of selection for non-broody characters, makes it possible to have a flock which is relatively non-broody.

Poor layers stop laying early in the year and take a long time to come back into production, while good layers lay well into autumn or later and come back into production after a comparatively short rest. Termination of egg-production is intimately associated with the annual moult though sometimes there may be birds which continuously lay through the moult and others which do not moult even after a year's lay.

MOULTING

Late moulters are quick moulters and it is a good sign to see a large number of birds almost naked in the flock. Birds which moult slowly, dropping a few feathers at long intervals, are poor producers.

In most parts of India, hens moult during July-August and poultry-keepers get busy during these months to spot out the best layers for breeding them in the winter months so as to raise pullets which will lay in September or October next.

Birds as a rule moult five times from birth to maturity and after that once a year. The average layer undergoes moult towards the end of the first year of her production. A pullet may reveal a partial neck moult. This may not interfere with laying, because it is mostly caused by underfeeding.

The time and duration of the first annual moult help in identifying persistent layers at the end of the first year of laying. Under ideal conditions, a pullet lays for about eight months from the time she lays the first egg and occasionally longer which means persistent production. Good layers occasionally lay for over one and a half years before moulting. If the moult, therefore, starts late, it is a problem to get eggs from these birds until late in the breeding season.

Research Scheme shows new possibilities in insect control

JOWAR EAR BUG

can be put down with a single, cheap treatment

by

K.R. NAGARAJA RAO

RESULTS achieved under a special scheme jointly financed by the Indian Council of Agricultural Research and the Madras Government have shown that the earhead bug, *Calocoris angustatus*, of *jowar* (sorghum) can be successfully controlled by the application of BHC dust of five per cent concentration. The improvement in crop-yield thus effected would amount to about 30 per cent.

The pest which is widely distributed all over South India is one of the most serious pests of the *jowar* crop, capable of causing heavy losses. It seems to have been first reported in South Arcot in 1891, whereafter the depredations caused by it have been assuming increasing proportions. All earlier attempts to control the pest were of no avail.

LIFE-HISTORY AND HABITS

The adult is a small green bug, and is found in groups of hundreds on the tender and developing ear-heads. Generally, the female which produces up to 200 eggs, inserts the cigar-shaped eggs under the glumes or in the middle of the florets. The nymphs hatch out in five to seven days. In the beginning, they are orange red in colour, but turn greenish as they feed and grow. The entire life-cycle of the pest occupies about 15 to 17 days.

The bugs subsist on a few species of grasses during the off season. The pest, as an adult and a nymph, has also been recorded on the ear-heads of *ragi* (*Eleusine coracana* Gaertn), *tenai* (*Setaria italica* Beauv), *cumbu* (*Pennisetum typhoides* Stapf) and maize (*Zea mays*), though it is a very minor pest of these crops.

The initial infestation starts with the very emergence of ear-heads from the plants in about the beginning of May in the case of the irrigated summer crop and by November-December in the case of the dry crops. The pest multiplies at an incredibly terrific rate and within a very short period of about a fortnight, the ear-heads literally teem with hundreds of nymphs and adults. The pest is most active and destructive during the period when the tender grains start setting and developing into the milky stage. Both the adults and the nymphs suck and feed on the cell sap. The drain is often so heavy that the very development of the grain is hampered and the affected ear-head turns black in colour, with a sooty mould spreading on the honey dew secreted by the bugs.

CONTROL MEASURES

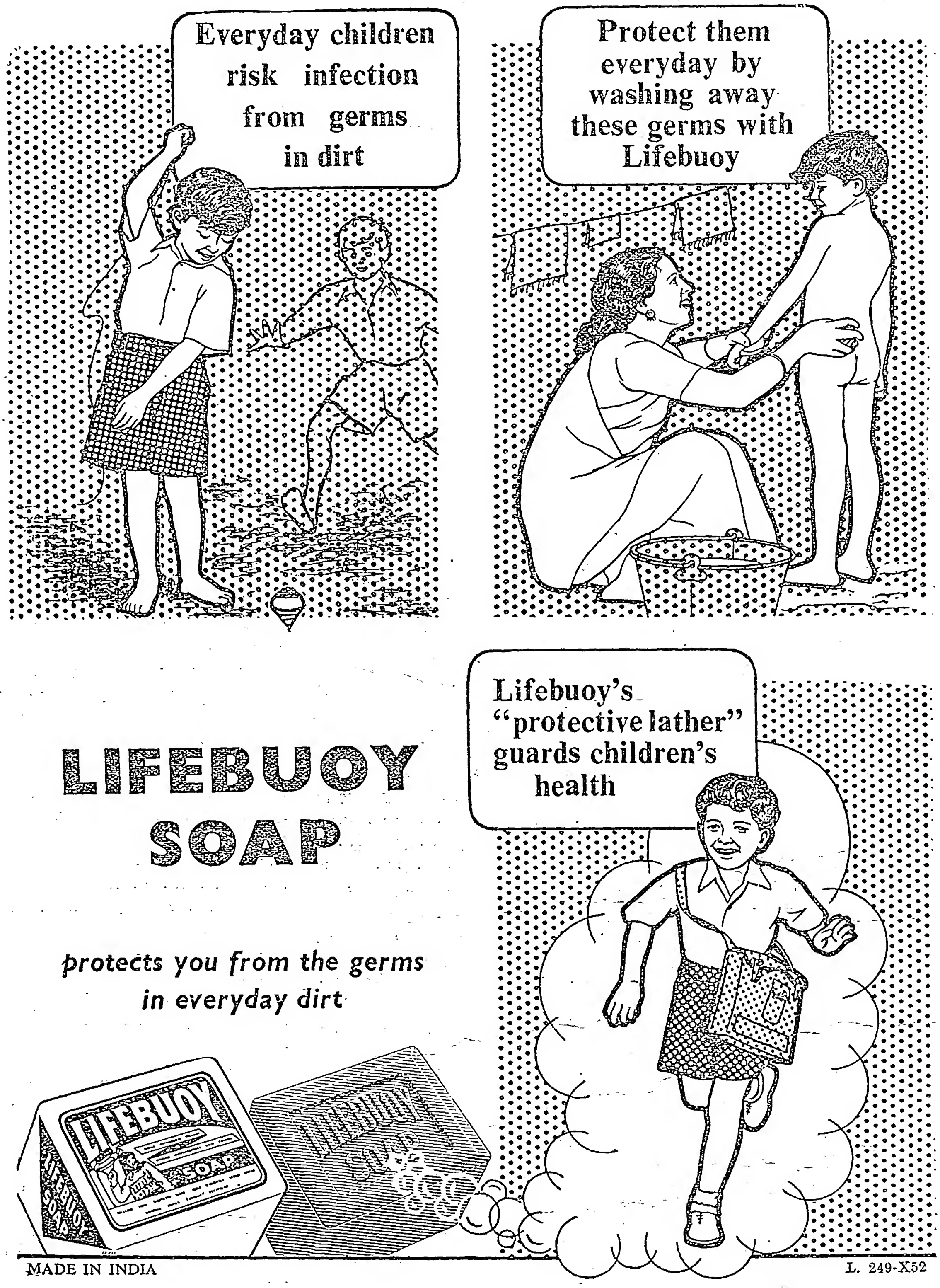
Earlier attempts to control the pest consisted of shaking the infested ear-heads over a tray of kerosenated water and hand-netting, but neither of these methods could control the bugs completely. Shifting the date of sowing a few days earlier, i.e., before the 15th March, was also tried and the method did afford some relief in the case of the irrigated crop in Coimbatore. This measure, however, has its own limitations in that it may not always be possible to make the field ready for early sowing of the summer crop. Regarding chemical control, sulphur dusting did not secure any relief and spraying of contact poisons proved impracticable.

HAND-MIXED DUSTS

Hand-mixed dusts of different concentrations of synthetic chemicals such as DDT and BHC were tried for the first time during 1946. The experiments were continued during the subsequent years, and both the chemicals at five per cent concentration were found useful in controlling the pest. But between the two, the lethal effects of BHC were more immediate and spectacular, since the entire insect population was exterminated in the course of about six hours while the action of DDT was much slower. The added advantage in the case of BHC is that it is decidedly cheaper than DDT. Even two per cent BHC has been found to be effective but it may not be available in the market.

The dust is best applied at flowering time when the pest is most active. About 20 lb. of the dust are ordinarily required for an acre and under ordinary circumstances, one judicious application at the proper time is enough. Exceptionally severe attacks, however, may require a second treatment.

The approximate cost of treatment comes to about Rupees five per acre whereas the value of the produce saved may range from Rs. 25 to 75.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Protect them everyday by washing away these germs with Lifebuoy
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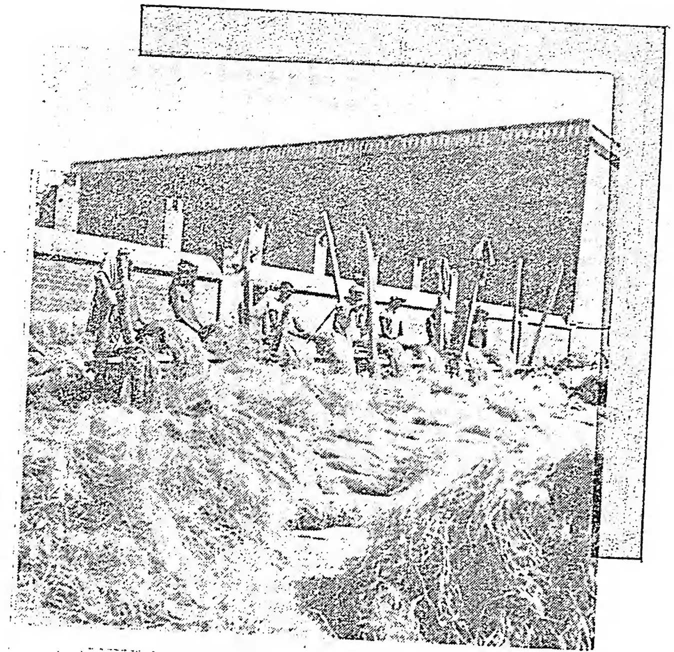
SANNHEMP NOW GOES BY AGMARK

With profit both to the buyer and seller

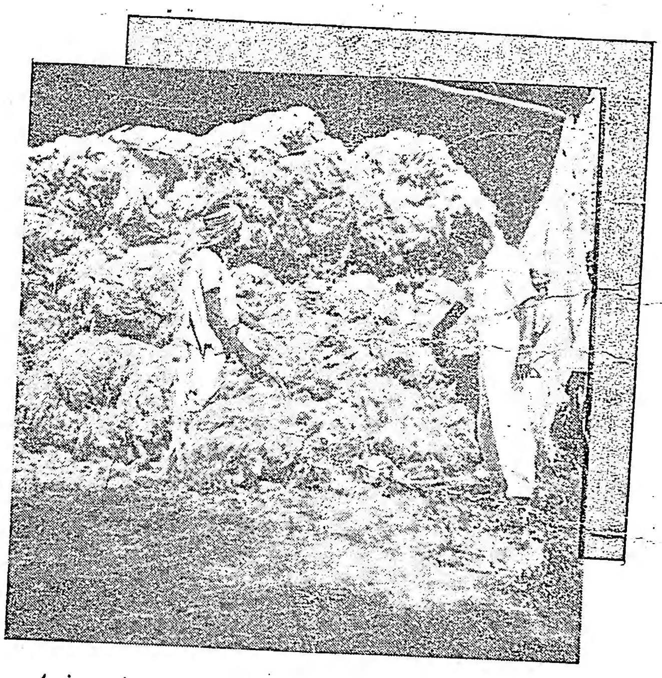
by
PARTAP SINGH



Dressing and grading of green sannhemp at an authorised packer's premises

QUALITY control of sannhemp exported from India through the Agmark Sannhemp Grading Scheme has brought in changes in certain aspects of marketing with benefit both to the seller and the buyer. The Scheme became operative on the 1st September, 1948.

Prior to the inauguration of the Scheme, foreign buyers used to receive consignments having admixtures of lower grades even up to an extent of 10 per cent, and used to be offered prices on the basis of the lower grade. Complaints used to be common that the different grades shipped abroad invariably contained varying proportions of lower grades, the idea obviously being to palm off some proportions of lower grades at prices realised for higher ones. At such a time, however, the Indian sannhemp actually used to get under-valued. With the elimination of such admixtures and reduction of refraction content to appropriate limits after the Scheme became operative, the buyers began getting correct grades and paying better prices.



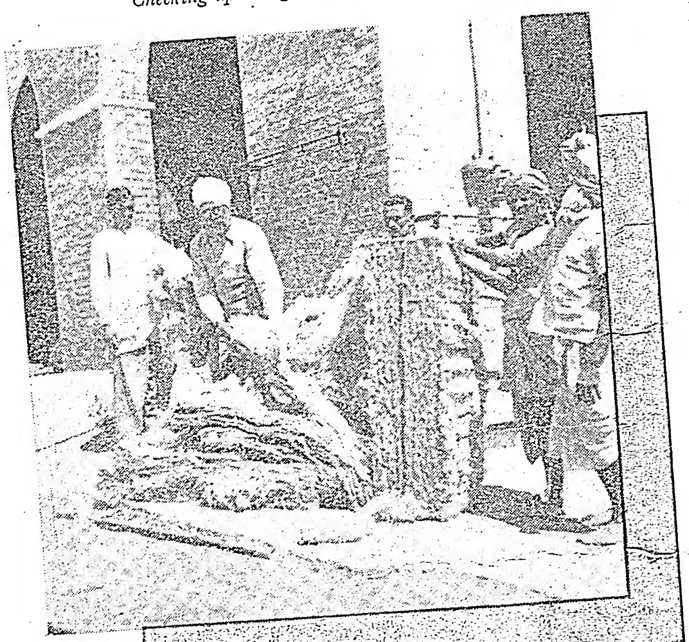
An inspecting officer testing the quality of graded sannhemp prior to its baling

GAIN IN PRICES

As a result, there has been an all-round increase in the prices of Indian sannhemp, although the prices for other fibres like true hemp, *sisal* hemp, jute, etc., registered appreciable reductions. It is believed that the rise in the prices of sannhemp has been principally due to an improvement in the standards of packing and their maintenance at appropriate levels as laid down by the Scheme. The gain in prices has been more than commensurating with the degree of improvement brought about in the standards of packing.

The fully pressed bale of sannhemp bearing the Agmark label going out of the hydraulic press, and another being roped

Checking-up the grade of an Agmark bale



BETTER QUALITY

Not only better prices have been realised, but claims on quality have also been almost eliminated. Before the Scheme was enforced, buyers abroad used to realise substantial sums as claims on quality from shippers in India. In 1947-48, for example, one shipper alone had to pay as much as Rs. 21,500 on 1,554 bales and the arbitration awards ranged from 72 to 135 shillings per ton. As against this, of the two lakh bales exported during the two and a half years immediately after the revised scheme came into force, only 275 bales came for arbitration and the awards ranged from 22 to 70 shillings per ton. Claims since then appear to be almost negligible.

SAVING IN MARKETING COSTS

Apart from this benefit, the Scheme has brought in an economic saving in marketing costs on the Agmarked *pucca* bales because of the removal of excessive refraction. Formerly, all this excessive refraction used to be packed and shipped with the sannhemp, which meant unnecessary additional expenditure on grading, baling, labour charges and railway and shipping freights. It is now estimated that a sizable saving has been effected on these items of costs because of the removal of excessive refraction.

Prior to the Scheme coming into force, local buyers used to take deliveries of *pucca* bales after examining a bale or two from each lot to satisfy themselves about the correctness of the grade. Whenever it suited the buyers, they used to manage to postpone taking deliveries for a number of days on that excuse. This naturally kept the sellers' money locked up for varying periods. Again, the buyers used to pay only 95 per cent of the value at the time of taking delivery of the bales and the balance was paid provided no claim on quality was received from the buyers. This again meant the locking up of a part of the sellers' capital for a considerable period.

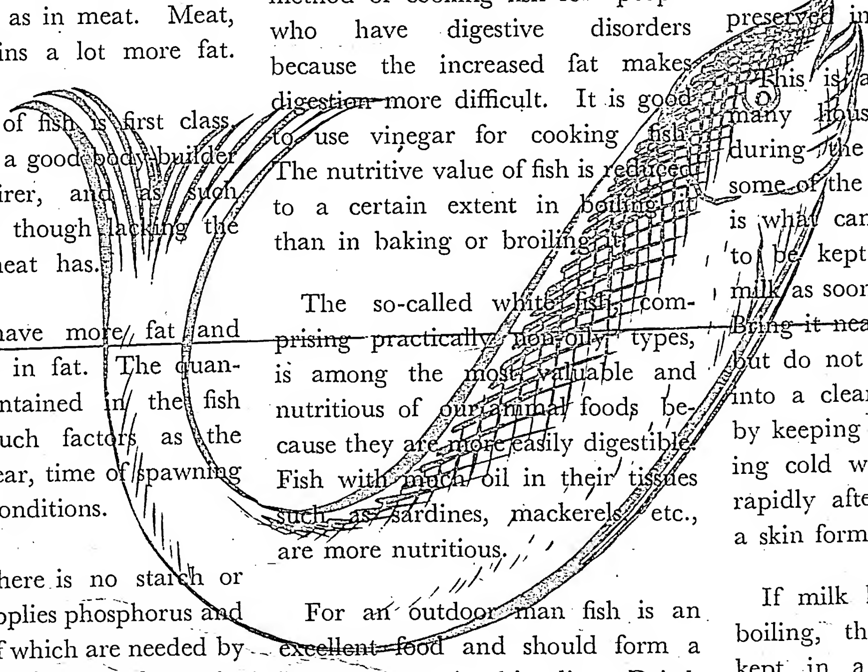
Now, because of the confidence in Agmark labels this disadvantage has been removed. The buyers now cannot postpone taking deliveries on the ground of examining the quality and they are also required to make full payment for their purchases.

CONFIDENCE RESTORED

Local buyers and shippers have also found the Agmark Scheme very helpful. They can now depend upon the quality of bales purchased from any packer. Formerly, bales bearing trade marks of a small number of shippers were acceptable to foreign buyers. Now, on account of the support lent by the Agmark labels, the bales bearing any trade mark have become acceptable. This has enabled not only new parties to enter into the trade but also some of the old ones which had gone out of it to re-enter the export business. With their coming in, the resources of the sannhemp export trade have been strengthened a good deal and the export section of the sannhemp trade has been placed in a better position to negotiate with the buyers abroad and to explore new markets for the produce.

IF YOU HAVE FISH

If you have fish, you sure have a good deal



If you have fish, you have a more complete meal. For, the fish has such good dietetic value that it is a very efficient protective food and unlike milk, meat and eggs, quite a cheap one too.

The amount of protein, which is a body-building substance, in fish is the same as in meat. Meat, however, contains a lot more fat.

The protein of fish is first class, in other words, a good body-builder and tissue-repairer, and as such is a good food though lacking the flavour that meat has.

Some fish have more fat and others are low in fat. The quantity of fat contained in the fish depends on such factors as the season of the year, time of spawning and feeding conditions.

In the fish, there is no starch or sugar, but it supplies phosphorus and calcium both of which are needed by your body. Small fishes, especially with edible bones such as the sardines, contain more of this. The sea fish contain small traces of iodine. Fish contains very little iron.

The Bengal fresh water fish is a rich source of calcium, phosphorus and iron. Fatty fish have the valuable vitamins A and D. Every one knows the utility of the liver oils of some of the fish.

COOKING FISH

In cooking fish a very slight loss of protein occurs. If fish are fried, all the nutritive value is conserved. Frying, however, is not a good method of cooking fish for people who have digestive disorders because the increased fat makes digestion more difficult. It is good to use vinegar for cooking fish. The nutritive value of fish is reduced to a certain extent in boiling it than in baking or broiling it.

The so-called white fish, comprising practically non-oily types, is among the most valuable and nutritious of our animal foods because they are more easily digestible. Fish with much oil in their tissues such as sardines, mackerels, etc., are more nutritious.

For an outdoor man fish is an excellent food and should form a regular item in his diet. Dried, smoked, salted and pickled fish are not as good as fresh fish from the point of view of digestion.

There is plenty of waste matter in fish in the form of bones, skin, etc. Whenever possible, the skin should be eaten as it contains the flavoury matter. Fish, compared to meat lacks flavour and hence requires to be cooked and served attractively. A well-cooked fish dish is a good sauce for a meal.

A QUESTION

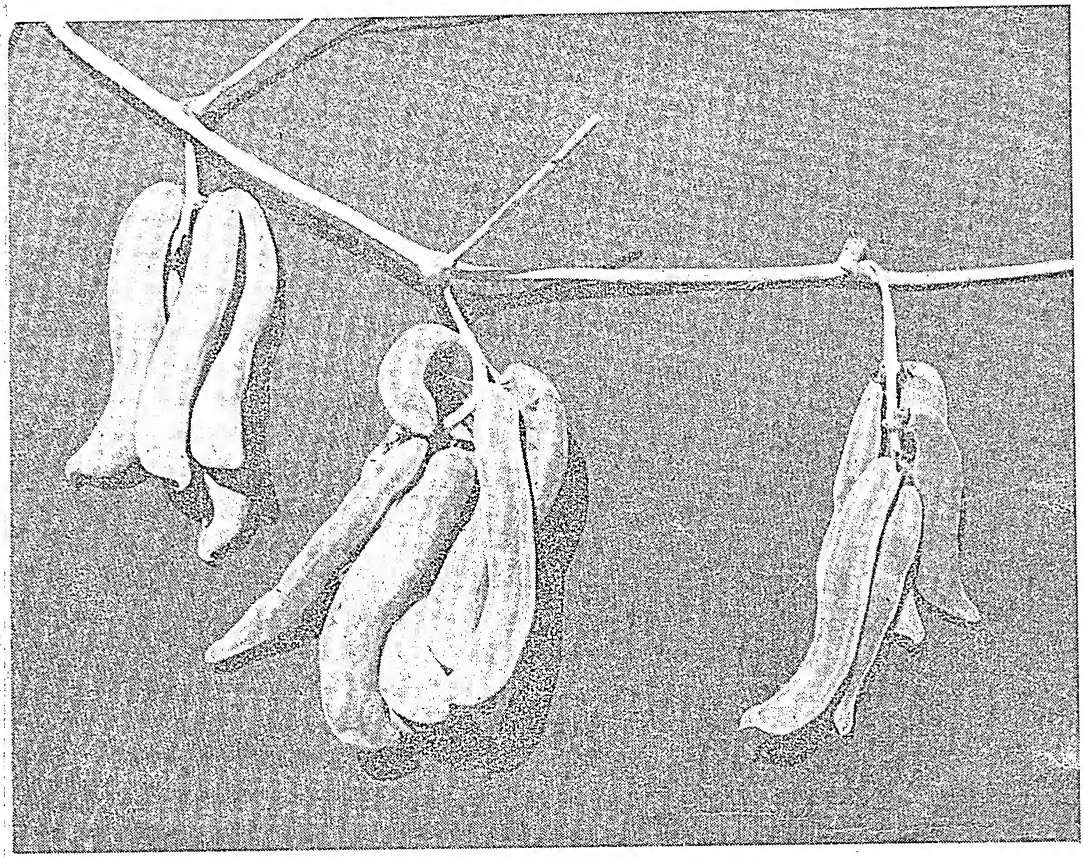
Here is a question from a housewife:

How do you think can milk be preserved in the hot weather?

This is a question that worries many house-wives who have to, during the hot weather, preserve some of the household foods. Here is what can be done. If milk is to be kept overnight, scald the milk as soon as it is brought home. Bring it nearly to the boiling point, but do not let it boil. Then pour into a clean jug and cool rapidly by keeping in a large bowl containing cold water. Cooling the milk rapidly after boiling helps prevent a skin forming on top.

If milk has to be kept without boiling, the milk jug should be kept in a bowl of cold water. Then a clean piece of cloth should be soaked in clean water and after wringing it out, completely cover the jug with it, making sure that all the ends are in the water in the bowl. Keep the bowl in a cool and airy place. The water evaporating from the cloth keeps a cool temperature round the milk jug.

MU
new



Fleshy and velvety pods of mucuna clusters

by
P. M. Dabadghao
and
R. T. Gandhi

DURING 1952-53, the season being very unfavourable for crop growth owing to the abrupt end of the monsoon in August, green fodder supply to dairy cattle became inadequate on the Farm. The situation was further aggravated by the failure of irrigation supply practically throughout September.

At this time, the dark green cover of mucuna or velvet beans in the field attracted the attention of every one on the Farm. Mucuna, evidently, was indifferent to the vagaries of the monsoon. It was utilised for feeding the dairy cows during the last week of November.

Even at this late stage, the crop yielded 180 maunds of green fodder per acre with only one irrigation. The fodder was relished by cattle when fed alone as well as a mixture with semi-dry *jowar* fodder in equal quantities. A bullock fed at 40 lb. of green mucuna fodder continuously for ten days during this period consumed every bit of it and interestingly enough, showed an increase of ten pounds in body weight.

Mucuna or velvet beans, botanically known as *Mucuna cochinchinensis A. Cheval* and *Mucuna deeringiana (Bort) Holland*, from Australia prominently attracted our attention during our search for new and better legume plants for trial as fodder crops under irrigated conditions.

The velvet beans are an annual *kharif* legume with a very vigorous growth. The vines grow 10 to 15 feet long and the field is densely covered in about 60 to 70 days after sowing in July. The general growth characters of both *M. Cochinchinensis A. Cheval* and *M. deeringiana (Bort) Holland* are more or less similar and they continue to remain green till the end of November. The only distinctive character is the size and colour of seed which is bigger and whitish in the former and smaller and blackish in the latter. The large and fleshy pods having a velvety touch are borne in clusters in both these species.

The profitable utilisation of mucuna in the cropping season was further confirmed by the results obtained during the season 1953-54. We then started studying the various avenues of its exploitation. In an attempt to improve upon the cropping system in the fodder supply scheme evolved earlier, mucuna was sown along with maize on a quarter-acre plot, side by side with the maize-cowpea mixture. The maize-mucuna

JCUNA, the
y green fodder

The wonder legume that laughs away droughty conditions

mixture yielded 380 maunds of green fodder per acre compared to the out-turn of 280 maunds per acre from the old maize-cowpea mixture. In the favourable season of 1953-54, mucuna alone yielded 200 maunds of green fodder per acre without any extra irrigation.

The next trial we attempted was to grow a mixture of maize and mucuna in successive monthly sowings from April-July. This mixture yielded more, to the extent of 45 to 50 per cent on an average, over the yield of comparable stands of maize-cowpea mixture. The mixture was not only superior in the total yield, but also showed better combining ability of mucuna with maize.

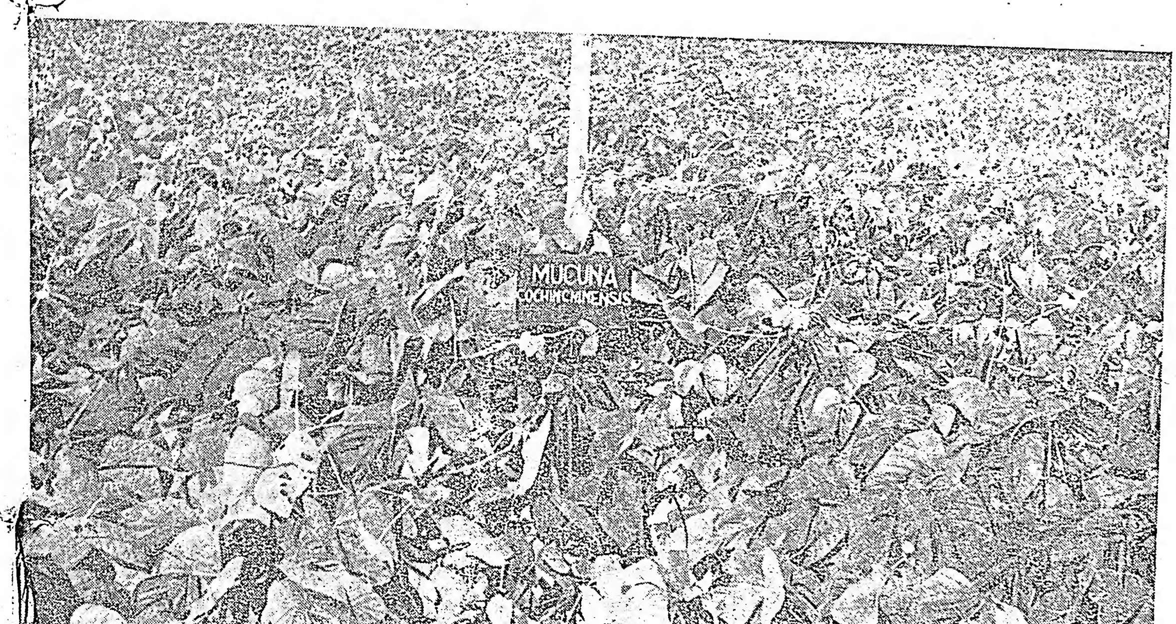
Unlike cowpea, which hardly kept pace with the growing maize plants, thereby covering the maize stalks only partially, mucuna was observed to grow quickly, uniformly covering the maize shoot all along its entire height.

The chemical analysis of this interesting legume showed 20 per cent protein, 2.31 per cent calcium and 0.84 per cent phosphoric acid, when cut at the flowering stage in October. Even during the mature stage at the end of November, the protein content remained at 13.9 per cent.

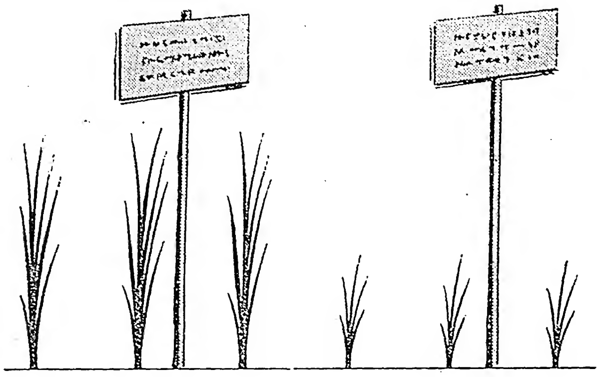
Mucuna can be cultivated for fodder like cowpea. The seed, however, is drilled in lines two to three feet apart, using a seed-rate of 80 to 100 lb. per acre. ✓One interculture in the initial stage of growth and manuring with two to two and a half maunds of superphosphate benefit the crop. Like other leguminous fodder crops, inoculation of soil with bacterial culture is necessary. On the same field the crop is always better from the second year onwards.

In view of the quick and luxuriant growth, high yielding capacity, excellent combining ability with maize for fodder, a high nutritive value, palatability, and above all, its quality to remain green during the month of November, mucuna is worthy of growing alone or as mixture with maize or *jowar* for green fodder.

A densely covered inviting stand of mucuna at the Indian Agricultural Research Institute, New Delhi



For the Village Worker



DRIVING A POINT

Teach yourself the easy ways of teaching villagers to do things

THE village worker on many occasions is called upon to teach villagers how to do new kinds of work. He may first have to do the job himself in front of the villagers to convince them of the utility of the method. Such a demonstration is called a method demonstration.

A method demonstration may be simple such as planting seeds in lines, treating seed for smut or using a mechanical sprayer; it may be more complicated such as making soap, drying fruits and vegetables or building a sanitary latrine.

METHOD DEMONSTRATION

So that a demonstration may be successful the village worker must know every step in the job perfectly. It would need a good deal of planning and careful practice to make a proper impression on his audience.

A properly timed demonstration will have greater effect on the villagers. For example, do not show villagers how to spray for insects *after* the insects have done their damage. There may also be jobs on which villagers themselves want to see a demonstration. The village worker should rise to the occasion whenever villagers express such a desire.

Having prepared yourself to give a demonstration, the help of the village people should be sought to secure the proper place for holding the demonstration. Care should be taken to decide on the best time, advertise the event properly and have enough space for all those who want to see. All the necessary equipment required for the demonstration should be procured well ahead of time.

The presentation will be interesting if you have chosen a subject in which people have shown interest. It is necessary that you should act naturally, be dressed for the particular job you are doing, so that you won't appear awkward to the villagers, and stand erect, looking at your audience when talking. The talk should be clear and easily audible. If you are able to show that you are enjoying doing the job you will appear more friendly, and hence be effective.

First of all, tell the villagers the what, why and how of the job. Then let willing villagers do

the job as long as time and interest allow, correct mistakes politely, encouraging questions and answering them thoroughly. In case you do not know the answer to a question, make it a point later to get the answer for those who are interested.

After a demonstration the village worker should make it easy for villagers to adopt the new practice. He should also help them get necessary equipment and materials. He should be available for any additional information needed by the villager. If possible, written instructions or a leaflet explaining

HOME THROUGH
DEMONSTRATION

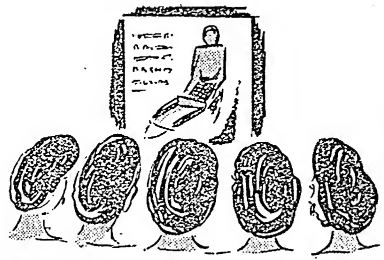
the process should be left with those villagers he hopes will adopt the new practice.

RESULT DEMONSTRATION

The measure of a successful demonstration is the number of people who adopt a new method. The method of showing people the value of an improved practice is called a result demonstration. This is done by comparing the improved and the unimproved practices so that villagers may see and judge for themselves, and may be used to teach the villagers the value of an improved variety of seed, anti-malarial measures, an improved plough, use of fertilizer, improved cultural practices, etc.

The practice demonstrated must be good and based on a real need of the villagers. This can be ensured by consulting an expert about the utility of the practice in the village, discussing it with the villagers, carefully assessing if villagers already know its value, and finding out if they are interested in the new practice.

After having decided to demonstrate the new practice a villager who has the confidence and respect of his neighbour and who is interested in improving his methods



should be selected to carry out the demonstration.

In the beginning, a demonstrator should be asked to demonstrate only one practice at a time. The village worker should visit his demonstrators to plan the demonstration by selecting plots which would be easily seen by the villagers, measuring off equal areas of land side by side, one showing the wrong way the other showing the right way.

Thereafter, all necessary material and equipment should be got ready and the village people had present when the demonstration begins. Proper records should be kept from the beginning.

In order to complete the job, make a calender of all work that must be done and visit the demonstration often to see that plans are being carried out properly. Give publicity to the demonstrator if the demonstration is succeeding. The village demonstrator should be allowed to do the talking. A summary of the records should be prepared and the results given publicity to get other farmers to demonstrate during the next season.

—From the forthcoming publication " Extension Guide for the Village Worker"

Planning for Proper Land Use in Damodar Valley

A scientific study of land has to be made before it can be put to the use to which it is best suited. Here is an outline of what is being done to put land to proper use in the Damodar Valley area

by

S. P. Teotia

LAND classification surveys as the first step towards planning soil and water conservation measures are being carried out in the Damodar Valley. Such surveys will provide basic data for grouping together of soils suitable for a given type of vegetation depending on the capacity or potentiality of the land to produce.

The whole of the upper Damodar catchment area, comprising 4.4 million acres, has been divided into a number of convenient units for the purpose of these surveys. Ultimately, the whole of the upper Damodar catchment will be surveyed. For the present, reconnaissance surveys have been carried out to locate problem areas where restoration work is urgently needed.

Land classification surveys are the basis for proper land use adjustment. They are an attempt in a systematic way to assign each area the use to which it is best suited physically, economically and socially. Land capability classification, however, does not necessarily reflect the present state of the land on which application of suitable methods of soil and water conservation such as provision of irrigation facilities for the paddy fields, afforestation of waste and unproductive lands, contour ditching and graded channel terraces for the uplands, reclamation of waste lands for upland cultivation and pasture and gully control or reclamation may have to be adopted to make it productive.

Soil conservation surveys include three types of surveys, viz., soil survey for mapping the various soil types, land utilization survey and erosion survey. Air photographs on six inches to a mile scale are being used as base maps for indicating soil types, present land use and erosion conditions.

SOIL SURVEY

Soil profiles of the size 4 ft. × 4 ft. are dug up to the depth of decomposed parent rock, and the position of each profile site is fixed on the air photograph. Some of the major and minor soil characteristics and associated land features noted along the traverse are soil depth, soil texture, soil structure, soil reaction, organic matter, drainage, permeability, type of parent material, slope and special features like clay pan or hard pan, calcium concretions, stoniness, etc.

The profile site is selected in the central position of an apparently uniform area. A full description of the soil profile at each examination site, along with a note on environment (relief drainage, physiography and vegetation), is recorded in the profile note book. Each horizon of the profile is examined as regards colour, structure, reaction, etc. Soil samples from the various horizons of a type profile are taken for analysis in the laboratory.

Soil boundaries may be indicated by a change in colour, topography, texture of surface soil and sometimes by vigour or species of vegetation. Soil boundaries are usually diffused or gradual rather than sudden or sharply defined. The soil boundaries are deduced by interpolation from evidence of soil profiles. Soil types are mapped from a study of soil profiles. A model profile with allowable range in the profiles is established for each soil type.

LAND UTILIZATION SURVEY

The purpose of land utilization survey is to map the present use of land such as crop land, pasture, forest, scrub land, orchard, water bodies (ponds, tanks, etc.) waste and unproductive lands, settlement (including roads, parks, buildings, etc.) and mining and also to distinguish and map the different types of land. This provides basic data to enable preparation of a land utilization plan to avoid further misuse of land.

Each of the major categories is further subdivided and mapped. For example, crop land is classified into upland and low land (paddy). These are shown by suitable symbols and colour combinations on the maps. For classification of land based on quality, four types are distinguished and mapped on the basis of inherent soil characteristics like depth, permeability, drainage, stoniness and associated factors like availability of water. These are good land, medium land, marginal land and poor land.

EROSION SURVEY

The objectives of erosion mapping are two-fold: "(a) To give a quantitative estimate of the changes that have occurred and (b) to give an indication of the past and possible future damage. Also it shows what is left in the way of productive soil."

Processes of denudation, transportation and deposition take place on an accelerated scale in every catchment unit under cultivation. The erosion map should form a base for any planning. Since in Damodar Valley the topography is very undulating and rolling, an undisturbed area is not available, except within a reserved forest, the selection of a 'reference profile' for each soil type is essential for mapping the degree of erosion. A normal profile is not possible since a virgin piece of land under permanent vegetation not subjected to erosion is not available.

A reference profile for each soil type is selected after due consideration of the area occupied by that soil type, as comparisons are to be made on comparable slopes. The standards of solum thickness or different slope classes within the permissible range of a soil type are slightly different. The erosion is estimated by weighing other soil profiles of the same soil type in the area with the reference profile of this soil type.

Soil erosion types are influenced by physiographic features and land utilization practices. Special erosional features are found associated with each physiogrphic unit. The different land forms, i.e., the plateau, escarpement, valley and rugged hilly regions will have different types of erosion. Areas where people are engaged in mining and industry and have neglected cropping get eroded more badly as compared to the areas where people are engaged in farming or areas under reserved forests.

In the case of gullies, in addition to frequency, the depth and width of gullies are also mapped. Mapping the depth and width of gullies helps in determining what control measures for conservation of gullies are to be adopted.

Depending on frequency, depth and width, some of the gullies can be reclaimed into paddy fields, some have to be afforested and then there are others that are non-reclaimable and have to be tackled as gully area. Conversion of such gully areas into conservation ponds or putting up gully plugs, check dams and spillways, etc., will all be governed by the depth and width of the gullies.

For the existing conditions in the Valley, the lands have been classified into the following four land use classes according to their capabilities by taking into consideration erosion, present land use and other relevant data on socio-economic factors:

Class I—Very good land, level or nearly level with little erosion. Easily and safely cultivable by ordinary good farming methods like fertilization and rotation of crops.

Class II—Good land, normally upland with slopes 0 to 3 per cent. Moderate sheet erosion but safely cultivable by adopting soil conservation practices like contouring, strip cropping, protective cover and water management by graded channel terraces.

Class III—A few low to medium gullies or slopes exceeding three per cent. Soil heavy and deep, slopes moderately or severely eroded. Readily reclaimable by mechanical or other means and bench-terraced paddy fields.

Class IV—Lands not suitable for cultivation, but suitable for pasture or forest with contour ditching, diversion dykes or terraces.

Research Note

COLD STORAGE OF GUAVAS

by

K. Kripal Singh and P. B. Mathur

EXPERIMENTS recently carried out at the Central Food Technological Research Institute, Mysore, have shown that the optimum conditions for cold storage of guavas are a room temperature of 47 to 50° F and a relative humidity of 85 to 90 per cent. The storage life was found to be four weeks and post-storage life (at 76 to 87° F Mysore room temperature) three days.

Guavas of the *safeda* variety were procured from the Government Fruit Research Station, Hessarghatta, Mysore State, for this experiment. Mature fruits showing a slight change in colour from green to yellow in two sizes, viz., a large size with a mean weight of 168·9 gm. and a small size with a mean weight of 92·9 gm., were selected. The greatest retention of ascorbic acid was observed at 47 to 50° F in both the sizes. Loss in weight was found to be lower in large fruits than in the smaller ones.

With regard to chemical changes in guavas during storage, there was an increase in the percentage of total soluble solids, a decrease in total acidity and ascorbic acid content at all the temperature ranges investigated.

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NEW BOOKS RECEIVED

Report of the Minimum Wages Committee (Agriculture), Government of Madhya Bharat. Copies available from the Commissioner of Labour, Baxibagh, Indore, Madhya Bharat.

"*Bhagirath*", a Monthly devoted to irrigation and power. Editor K. S. Rangappa. Annual subscription Rs. 3, single copy Annas 4. Copies available from the Director, Publications Division, Old Secretariat, Delhi.

Fifty Years of Co-operation, Golden Jubilee Souvenir, 1904-54. Published by the Bombay Provincial Co-operative Institute, 9, Bakehouse Lane, Fort, Bombay. Pages viii+300, price Rs. 10.

A survey of co-operative development and a study in co-operative problems in India.

The Feeding of Farm Animals in India by P.E. Lander. Issued by the Indian Council of Agricultural Research; available from M/S. Macmillan & Co., 294, Bow Bazar Street, Calcutta 12. Pages xii+492+LII (appendixes), price Rs. 14.

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WHAT'S NEW IN FARMING

GREEN MANURE ON THE SPOT

GLYRICIDIA MACULATA is becoming more and more popular with rice-growing farmers in Madras State as a leguminous plant that provides green manure more or less permanently and on the spot. It is generally grown on the bunds of paddy fields.

A week before Glyricidia seedlings are transplanted, pits, a span or more in diameter, are dug six feet apart and filled in with well-decomposed farmyard manure or compost. The pits are next well-watered, and two to three weeks old seedlings are planted one in each pit and watered. Care is taken to see that seedlings of only two to three weeks are planted. In lifting the seedlings, special care is taken to see that the roots are not damaged. By the time paddy is harvested, the seedlings would have grown beyond the reach of goats and stray cattle.

Branches of Glyricidia are lopped off for the first time a year after the plants are established, and thereafter as and when required.

A pound of Glyricidia contains about 6,000 seeds. The plant is most suitable for growing on the paddy field bunds where two paddy crops are raised in a year.

At the Aduthurai Research Station in Madras State, a single Glyricidia plant gave as much as 300 lb. of green leaves from the third year onwards.

If plants from one pound of seed are raised and properly tended, they will yield, according to specialists, enough green matter for manuring 300 acres from the third year onwards.

DRY SEED-BED FOR PADDY

Investigations carried out at the Central Rice Research Institute and elsewhere have shown that wherever the sowing of seeds in lines in seed-beds is practised in some of the rice-growing tracts in the country, a new method can be tried with success.

According to the new method, seed at the rate of three to four pounds per cent of nursery is sown in plough furrows. As the plough furrow is formed with a country plough, a man follows it sowing the seed. Roughly, about nine ounces of seed are required to sow 100 running feet of the furrow, if the seed-rate is three pounds per cent of bed. As the plough makes the next furrow at a distance of about ten inches, the seed sown in the previous furrow usually gets covered. The sowing can be done in straight lines by a skilled ploughman, which will facilitate weeding later.

It was found that seedlings by this method grew robustly and the uprooting was also as easy as in the Japanese method.

The method is now strongly being recommended for soil conditions as in Cuttack, where the land is well-ploughed after paddy harvest, and the soil is of the nature of a sandy loam. The method does not involve as much labour as in raising seedlings by the Japanese system.

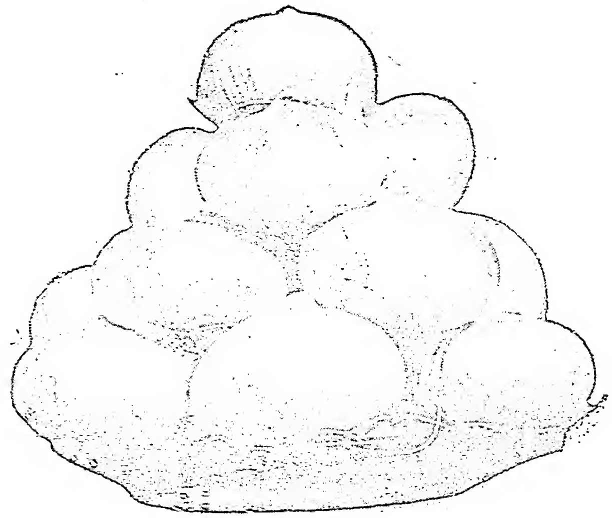
WASHING SHEEP

The washing of sheep before shearing has been advocated as a means of improving the make up of the wool clip for the market. Some sheep breeders have taken up the washing of sheep before shearing, but they do not know much about the interval desired between the two operations. Neither a short nor a long interval is desired. It has been found in the Punjab that an interval of seven to nine days under normal weather conditions between washing and shearing gives the best results.

GROWING ONIONS

Who does not know the way of cultivating onions ? But here is how you do it better

by
S.S. Purewal



The Large Red Flat variety of onions

AN ONION is a ripened bulb of a biennial plant botanically known as *Allium cepa*. The flesh of the bulb comprises the swollen bases of the green foliage leaves and fleshy scales. In the early stages of growth when days are short, the foliage leaves develop, whereas with the approach of long day conditions, the leaf bases begin to swell to form a bulb and no further foliage leaves are formed and swelling of the basal fleshy scales progresses till maturity.

The onion was cultivated before the era of recorded history, and used as a food by natives in many Middle Asiatic countries, believed to be the primary centre of origin of the bulb onion. The Near East Asiatic and the Mediterranian regions are believed to be the secondary centres of origin. Onion has a Sanskrit name and is grown in India since remote times.

Onion is an important vegetable crop, extensively grown all over India both as a field and garden crop. The crop is raised mainly for home consumption, but the production of mature onions in the States of Bombay and Madras is more than the local requirements, and most of the exports are made from these States. Nearly a million maunds of onions are annually exported from India to Japan, Malaya States, Burma, Ceylon, Hong Kong, Portuguese East Africa and Persia.

Onion is popularly used both in the raw and mature bulb stages as vegetable, in salads, pickles, sauces, extracts like onion powder and onion salt and for flavouring culinary preparations. Onion is considered of little practical importance from the point of view of healthful food, and it is said that the purchaser of onion pays mainly for its smell. In protective foods it contains a little of vitamins C and B, also traces of iron and calcium.

These facts, however, do not minimise the popularity of onion. Practically all types of people like it and appreciate it in spite of its pungency and strong odour that lingers for a considerable time after it has been consumed or handled. The chewing of a few seeds of caraway or a small cardamom will immediately suppress this odour.

The particular substance to which onion owes its pungency is a volatile oil known as allylpropyl-disulphide. The pungency of the onion varies with the variety, stage of maturity, the type of soil and soil moisture, growing temperature and the length of storage period. There is a steady increase in the volatile substance till the maximum is reached just before the tops begin to fall over. Then it gradually decreases. Varieties with more moisture-content are less pungent than those with comparatively less moisture-content.

Onions grown on sandy soil are less pungent than those grown on other types of soil, but the pungency increases with the increase in average growing temperature. The onion odour acts as a repellent to insects. It is said that during the Great Plague of London the only places immune to plague were the onion and garlic shops. It is a common belief that the snake does not enter the premises where white onions are kept.

Freshly expressed onion juice is used against

flatulence, dysentery and cholera. The ripe bulbs are a useful feed for cattle and poultry.

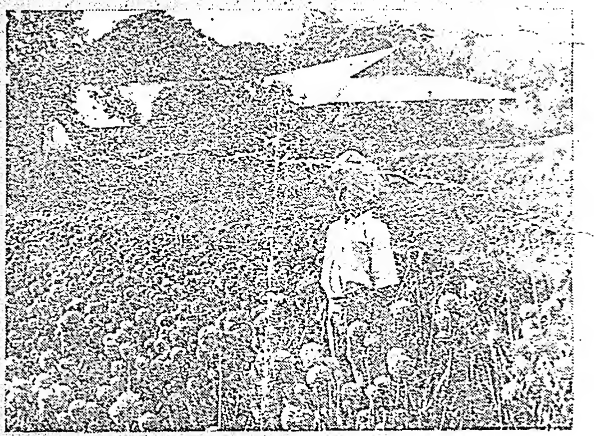
CLIMATIC REQUIREMENTS

The onion can be grown under a wide range of climatic conditions, but it succeeds best in a mild season without great extremes of heat, cold and excessive rainfall. The plant is quite hardy and in the young stage can withstand freezing temperature. A comparatively cool temperature and an ample supply of moisture are necessary for the plant in the early stages of growth, but during ripening, warm and dry conditions are necessary for proper maturation, harvesting and curing of the bulbs.

A longer daylight of 12 to 16 hours and a high temperature of above 80° F have a positive influence on bulb-formation and maturity, and consequently on the yield of onion bulbs. But the initial growth of the roots and tops of the onion plant is more vigorous at comparatively low temperature of 68°F and short day length of 9 to 12 hours. If these conditions continue during the bulbing stage, the onion plants go to seed readily, whereas even with the long days if temperature is low, maturation does not take place. It is, therefore, essential that the sowing time should be so adjusted that the plants make enough vegetative growth before the approach of the bulbing stage.

SEED AND SOWING TIME

The bulk of the main ripe onion bulb crop is grown in the country from true seed, the seedlings of which are first grown in the nursery bed for transplanting out in the field later. In northern India, the seed is sown in the nursery bed from August till the end of November, but the best time for sowing the seed is from the 15th of October to the 5th of November.



An onion seed crop in bloom

Seedlings raised from the seed sown earlier than the 15th of October are usually transplanted for the production of green bunching onions locally known as *ghandel* or *laira*. Desirable types of bulbs cannot be obtained from this crop, as most of the plants will produce seed stocks resulting in small-sized hollow bulbs. The transplanting of seedlings into the field is done when they are six to eight weeks old during the month of December-January.

About six to eight pounds of seed sown in the nursery bed will produce enough seedlings for an acre, but when the crop is sown directly in the field, the seed-rate should be doubled to ensure good stand. Although onions withstand crowding, provided other conditions for growth are favourable, the seed-rate should be so adjusted as to avoid the laborious and costly job of thinning.

In most parts of Bombay, the best sowing time in the nursery bed is the middle of October and eight to ten pounds of seed is used to raise enough seedlings for an acre. In some other parts of the State like Dharwar and Hansur taluk of Mysore, the crop is raised during the summer months by sowing the seed direct in the field in April-May. The sets produced are pulled out in the beginning of August and replanted in the beginning of September to raise the main crop in December. The seed is sown during the months of October and November in the State of Hyderabad, middle of December in Madhya Pradesh and Berar and from September to November in West Bengal.

On the hills, the crop is raised during the summer months and the seed is sown from the end of February to the end of May, but in places where snow-fall is not heavy, the winter crop of October to June, is also raised. The germinating power of the seed does not last long, and the viability is lost in one to two years. Good seed is triangular and black or dark brown in colour. The loss of germinating capacity can be made out when the seed looks paler, especially along the marginal edges. Such seed is light in weight. An ounce of normal seed has about 7,000 seeds.

PREPARATION OF SOIL

Although onions can be grown successfully on a great variety of soils, easily worked, deeply cultivated loams are most suitable for the crop. In fact, all friable soils such as alluvial soils and sandy loams are quite suitable, because of the delicate nature of the young seedlings and the great amount of hand labour required in onion culture.

Growing on light sandy soils results in earlier maturity than on heavier soils, and when properly enriched with organic matter and fertilizers, solid heavy bulbs of a superior keeping quality are produced, while very acid and very alkaline soils cause slow growth and late maturity of crop. However, the commercial production of onions is not difficult and soils of various textures are either suitable or can be made suitable by cultivation and manuring.

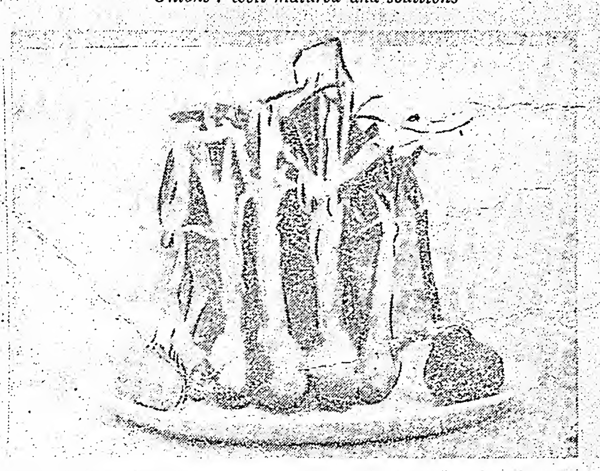
Normally, badly drained soils are not satisfactory. Clay soils should also be avoided as they become too hard and compact for obtaining the best results. A level land is preferred, because seeds, sets or young shallow-rooted plants are easily washed out on sloping areas. This aspect is also important in the production of a good crop. The field should be open, away from shading trees and taller crops that prevent free circulation of air and exposure to the sun rays. Clear land, free from weed seeds should be chosen, preferably land that has been well-manured and cultivated or cleaned from a previous crop.

Rotation is very important, and onions usually follow a heavily-manured crop like potatoes which requires a thorough cultivation and leaves the land comparatively free of weeds. Onions following clovers and cereals thrive well.

The method of preparation of land will depend mainly upon the character of the soil and the crop previously grown. Onion grown from seed requires a finer degree of tilth than most vegetables. The soil preparation must be thorough to prepare a fine, firm and smooth seed-bed. The last operation before sowing seed or transplanting should be a good rolling to consolidate the soil. Deep ploughing is not to be done, except for breaking the stubble.

In places where onions are to follow rice, the excessive water should be drained off by making trenches 20 ft. to 30 ft. apart immediately after harvesting the rice crop. Land should be ploughed with a furrow-turning plough and left for drying. Three to four shallow ploughings may be given subsequently, clods broken and pulverised by using a roller. Onion being a shallow feeder, most of the roots penetrate to a depth of not more than two to three inches and the crop thrives well on a hard bottom. Deep ploughing, therefore, is unnecessary for onion.

Onions: well-matured and scallions



MANURING

The soil for onions should be rich in available plant food, especially humus, as such a soil is retentive of moisture and its surface can be worked to a fine tilth. It has been found impossible to obtain high yields without an adequate supply of organic manure applied to the soil well in advance of the planting or sowing time. Farmyard manure or green manures must be used freely to maintain a favourable physical condition of the soil.

Well-rotted farmyard manure should be applied at the rate of 10 to 20 tons per acre after the first ploughing, so that it may become well-mixed during subsequent ploughings in the preparation of the seed-bed, or it may preferably be applied to the preceding crop.

Application of commercial fertilizers, particularly the nitrogenous ones, especially when farmyard manure is used in smaller quantities, prove beneficial, but overdoses are detrimental to the keeping quality of the bulbs and cause the appearance of 'bull necks' in a higher percentage of the crop. Nitrogen-starved plants are yellowish green and thick-necked. An application of six maunds of ammonium sulphate —half at the time of transplanting and the remaining half one month after, gives best results. Soot and ash are popularly used with advantage as a dressing after the crop has been transplanted.

VARIETIES

Onion being an old and established vegetable, there are a large number of varieties in cultivation throughout the country, differing in colour, shape, size, pungency, keeping quality and time of maturity. No systematic classification of these varieties has been attempted in this country as varieties are passed and listed by seedsmen under various local names, such as Red Globe, White Globe, Yellow Globe, White Patna, Large Red, Patna Red, Poona Red, Nasik Red, Yedu Giri or Bellary Red and Dhulia, mostly named after the colour of the skin or outer scales, which may be red, white or yellow.

A number of imported types like White Portugal, Silver Skin, Australian Brown, Red Italian and Sweet Spanish are also offered by seed merchants. The white-skinned varieties are mild and of good flavour as compared to the red varieties that are comparatively

Healthy and blight-affected (left) non-seed stalks

more pungent, but keep better owing to the presence of catechol and protocatechic acid in the skin.

SOWING METHOD

Ripe onions are generally produced from transplants, which in turn are produced by sowing the seed in the nursery bed, six to eight weeks prior to transplanting. Dry onions are also produced by planting seed directly in the open field where the crop is to mature, as well as by planting medium-sized mature onion sets.

FROM TRANSPLANTS

The chief advantages from this method are the use of a lesser seed-rate, earlier maturity, the formation of large and more uniform bulbs, a better stand, higher yields and better control of weeds. However, the main disadvantage is the laborious and costly method of transplanting by hand.

For production of the seedlings, seed should be sown broadcast or in drills made four to six inches apart in a thoroughly prepared bed, the soil of which has been enriched with the addition of a half ton of well-rotted farmyard manure and two pounds of ammonium sulphate per *marla* (272 sq. ft.) space. About two pounds of seed is sown per *marla*.

The seed should be covered about half inch deep with fine soil. Water should be applied with a sprinkling can immediately after sowing, soaking the soil well, or a light irrigation given. Irrigation should be repeated every third or fourth day, till the plants are well-established. The seedlings will come up in about a week's time, and will be ready for transplanting in six to eight weeks.

The field where seedlings are to be transplanted should be divided into small plots of a convenient size for irrigation and marked in rows 9 to 12 inches apart, and seedlings set out three to four inches apart in the rows. Although closer plantings than these give higher out-turn, the size of the bulbs will remain small and will not be suitable for marketing. Seedlings should be set not deeper than one to one and a half inches. An irrigation may be given immediately after transplanting.

FROM TRUE SEED

Onion may be propagated by sowing the seed directly in the field in rows 12 inches apart. The seed is dibbled about half inch deep in heavy soil, three-fourth of an inch in most soils and one inch in sandy soils. For sowing directly, the seed-bed should be prepared as thoroughly as possible, pulverizing the soil completely and levelling the surface even and smooth. Then the field should be laid out in plots to facilitate irrigation. The rows may be marked by stretching a long rope and walking over it, and on these marks furrows may be opened with the sharpened end of a stick or some sort of marker, opening three or four furrows at a time. The seed may then be dropped by hand so that the seeds are spaced about one to two inches apart in the furrows.

Coarse sand may be mixed with seed to facilitate even distribution. In case the sand has been mixed with seed, it should be lightly covered in the furrows. A very light irrigation should be given immediately after sowing followed by another after four to five days. The seedlings will push through the surface in about a week's time. When the plants are six to eight weeks old, they may be thinned to the proper distance in the row and the thinnings transplanted in some other plot or sold off. This method of growing onion is not practised in this country to any great extent, but it is worthy of adoption.

GROWING FROM DRY SETS

The third method of producing onion is by planting dry onion sets from the previous year's crop. The crop grown from the sets yields higher and matures earlier when the market prices are high. The sets are planted in rows 12 inches apart and spaced four inches in the rows. The medium-sized sets of half to three-fourth of an inch diameter are the most desirable for planting, as the larger sets send up seed stalks before the bulbs reach a marketable size while small sets give weak plants. About 15 to 20 maunds (1,230 to 1,640 lb.) of sets will be required to plant an acre.

The dry onion sets are small bulbs produced by growing the plants under crowded conditions in the field. Seed is sown thickly in rows, nine to twelve inches apart. About one to one and a half maunds (80 to 120 lb.) of seed is required to plant an acre (75 to 100 seeds per foot of drill in the same manner as described above).

For the production of sets, globe-shaped early varieties should be used, as the sets from these keep better in storage. The sets should be harvested as soon as the crop is ripe and before real hot weather sets in. They are pulled out by the handful, the tops twisted off and the bulbs dropped in a basket and removed from the field. The sets should be removed to shade for curing as they are harvested. If they are left in the hot sun their keeping quality is impaired. After curing the sets, the largest bulbs should be screened out and used for pickling or kept for the production of early green onion. The rest of the sets should then be removed to storage where they should be sorted out occasionally and the rotting ones removed.

The green onions or *ghandel* as they are called in the North, because they start to send up seed stalks and become tough unless pulled out promptly and sold in the market, are grown for sale when in the green stage. The simplest way to produce green onions is to plant the smallest bulbs from the previous crop in September to October in rows nine to twelve inches apart and the bulbs spaced four inches in the rows. If large bulbs are used, they may be cut into three to four pieces each, taking care that each piece has a portion of "stem plate" (root zone) with it. The large dry onion sets may also be used to advantage for the production of green onions. These are usually ready to be pulled out four to five weeks after planting.

IRRIGATION

Onion requires a steady moisture supply for continuous growth. Irrigation should be given once every two weeks during the cool growing period, and more frequently when the hot weather sets in. In all, eight to nine irrigations are sufficient to mature the crop. When the crop is nearing maturity, it may be watered sparingly and when the tops start falling over, irrigation should be stopped altogether.

WEED CONTROL

In order to produce a good crop of onions, it is

necessary that weeds should be kept under control, especially in the early stages of growth when the plant grows slowly and is readily injured by weeds. Frequent weedings should be done so that the weeds do not become large enough to rob the onions of moisture, nutrients and light. Moreover, if the weeds are allowed to overgrow, in removing them the root system of the onion plant may be disturbed, causing an abnormal development of the bulbs. The onion is a shallow-rooted plant and deep tillage is likely to injure the roots and thus decrease the yield.

HARVESTING

The green bunching onions, *ghandel* or *laira*, are harvested as soon as they attain an edible size. Several pullings, usually by hand, are obtained, and each time only the largest plants are removed, leaving the others to develop further. The roots are washed and the outer skin is peeled off leaving the stem clean and white. The onions are then tied in bunches, the number in each bunch depending upon the size of the onion bulbs and local custom.

Onions for the market should be harvested when they are fully mature. Maturity is indicated by the tops falling over while the leaves are still green. The onions should be pulled out when the tops have fallen over and the leaves have turned yellow. This insures getting the onions harvested while they are in good condition. If rains start while the ripe onions are still in the field, they start into a second growth, ruining their keeping quality. However, in case of the scallions, i.e., plants whose necks remain rigid and the tops do not fall over, ripening is abnormal and indicates a poor keeping quality.

The bulbs are pulled out with the aid of a sharp-edged hand tool (*khurpa*) and soon removed to shade for curing, in order to avoid sun-scalding in an excessively hot weather. The tops should be cut off one to one half inch from the bulb as soon as possible after the bulbs are removed from the field. The onions should be spread over the floor of the room in a layer not over three to four inches deep and should be cured for a week or ten days, till the necks have altogether dried. A well-cured onion is firm and the top of the bulb is not readily dented with the thumb.

STORAGE

At the time of harvest, the market price for onions is usually very low, and as such it is customary to store onions for a pretty long time either for home consumption or for sale when market prices are higher. In the countryside, onions are usually stored by spreading them on the floor or on racks or keeping them in baskets in well-ventilated thatched sheds or rooms.

Frequent inspection and removal of rotting bulbs and loose skins and turning over of the stored product should be done. Occasionally, they are stored in small thatched pyramids of wheat straw, sorghum straw or *sarkanda*, constructed in the open on roofs or under shade to allow the circulation of a maximum amount of air around the bulbs and to provide protection from rains or moisture. This method is probably the cheapest and quite efficient. Onions are most profitably stored in cold storage at 32 to 36° F and low humidity (60 to 70 per cent).

Onions for storage should be thoroughly matured, cured and dried before being stored. Onions of good keeping quality are solid to the touch and have tough clinging skins. Soft and immature specimens and those with thick necks, bruised or injured do not keep well and should be eliminated.

YIELD

The average yield of ripe onions varies greatly with the type of soil, irrigations given and the amount of manures and fertilizers applied. The average yield of a transplanted crop varies from 100 to 300 maunds (8,200 to 24,600 lb). per acre. When the crop is raised by growing the seed directly in the field, yields are low, but when it is raised from sets, the yields are usually usually high.

MARKETING

Ripe onions are either marketed soon after harvest-

ing or kept in storage for a considerable time for disposal at a later date. When the produce is to be disposed of at harvest, it should be taken to the market immediately as the bulbs lose weight greatly after harvesting. The cured onions are usually taken to the market in ordinary gunny bags, but it is advisable to use open mesh sacks with a coarse mesh through which the bulbs can be readily seen. These are attractive and give ventilation and facilitate inspection by the prospective buyer. Grading is not ordinarily done in this country, but to secure good prices, it is highly desirable that proper grading is done before marketing the produce.

SEED PRODUCTION

Selected bulbs of a large size from the previous year's crop are planted in the field in rows two feet apart and bulbs spaced one foot as under during the month of September-October. A furrow three to four inches deep is opened and the bulbs are set in and covered by hand. Prior to sowing, one half to one third of the top portion of the bulb should be cut off to facilitate the emergence and straight growing of shoots. Moreover, the cutting of the bulbs is associated with earlier sprouting, better stand, more seed stalks and larger yield from both the plant and seed stalks. The upper cut portion may be used for edible purposes. Onion is a cross-pollinated plant, and as such when the production of seed of more than one variety is desired they should be spaced at least a furlong apart. The seed should be harvested when the capsules ripen and the black seeds are seen. The umbels or seed-heads should be cut from the stalk and collected in a cloth, supported round the waist of the picker. When thoroughly dried, the seed should be threshed and winnowed clean and thoroughly dried before storing.

PESTS AND DISEASES

Onion, though comparatively free from diseases and pests, is severely attacked by the most injurious insects called onion thrips (*Thrips tabaci*). Thrips are very minute, slender-bodied, whitish, sucking insects, which attack the leaves of the onion plants, giving them a blanched or blighted appearance. The insects feed under the sheath of leaves, in-between the young leaves at the centre of the plants and even inside the broken and split leaves. The leaves become curled and deformed and the outer leaves turn brown at the tips. The insects are most injurious during dry weather. As soon as the insects are noticed attacking the crop, it should be dusted with five per cent B.H.C or sprayed with D.D.T. 550 powder—two ounces in 33 seers (66 lb.) of water. The dusting and spraying should be repeated at weekly intervals till the pest is under control.

Alternaria palundii is a fungal disease attacking the foliage and seed stalks of the onion plant. Localised brown spots appear that gradually spread and coalesce, forming into dead lesions. The leaves and seed stalks consequently die and fall over, resulting in a tremendous decrease in yield. As a prophylactic measure, the crop should be sprayed with 3 : 3 : 50 : Bordeaux mixture. The burning of dead tops, a proper rotation and dusting with flowers of sulphur are recommended for the control of the disease.

Neck rot caused by *Botrytis allii* attacks mature onion bulbs in storage. The infection usually takes place at curing time, through the exposed moist tissue. The white varieties, scallions and injured bulbs are more susceptible than normal ones. The lesions on the bulbs appear as sunken dried areas about the neck but may involve the whole bulb that ultimately rots, giving a stinking smell. The fungus can tide over the winter. The disease can be controlled by proper rotation or sanitation, elimination of late application of fertilizers to avoid scallions, clean tillage, rapid curing, close topping, careful handling and thorough ventilation throughout the storage period. The rotten bulbs should be occasionally sorted out.

Indian Farming

VOL. IV OCTOBER 1954 No. 7

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

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THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

THE PROBLEM OF NUTRITION

SOUTH-EAST ASIA is a land mass which has gained notoriety for being one of the densely peopled parts of the world. India belongs to this region and the pressure of population on land in this country has been widely acknowledged.

Apart from the question of human beings, India has another formidable problem to contend with. This relates to cattle. India has almost two-thirds of the world's bovine population.

Thus the problem facing agricultural planning in India is to provide adequate nutrition both for men and cattle. In fact, this competition between cattle and human population for food is one of the many characteristics of Indian agriculture. Because human population is growing at an accelerated pace, more and more land is being brought under cultivation, so that the land left for the production of cattle feed is getting increasingly diminished. It is, therefore, apparent that if agriculture is to progress in India on reasonable lines, a balance should be struck between the nutritional needs of the human population and those of cattle.

Because of the ban imposed on the slaughter of cattle in many parts of the country, it is reasonable to assume that the number of cattle will increase to a great extent in future. So, as years pass by, a large number of cattle has to be cared for than previously. Also at the present rate of increase of human population, provision has to be made for feeding a larger number of men, women and children on an increasingly diminishing land allotment per capita.

It appears that the only way of solving this problem is to hit upon certain food crops which can be utilised in part for feeding human population and in part for cattle. At present, fodder has to be specially grown for cattle and food for human beings. Apparently this may not be possible to any considerable extent in future. It may, therefore, be necessary to breed varieties of crops which can remain in a succulent stage even at the time of grain production. This might be helpful to a solution of the problem as the grains may be utilised as food for human beings and the straw as fodder. This may appear fantastic at present, but human history is replete with stories of impracticable ideas being given concrete shapes by mere stress of times.

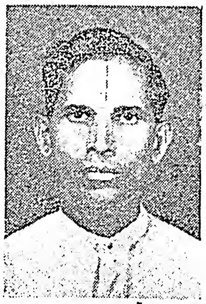
Of course from time to time suggestions have been made for maintaining cattle on processed refuse or rejected parts of human food materials. Thus, for example, it has been reported that mango seed kernel, *jaman* seed, etc., after appropriate treatment, could be utilised as cattle feed. Certain treatments given to straw, especially of paddy, have been reported to make it palatable as fodder.

Although the question is yet to be tackled, much less solved, what has been said above indicates that there is a growing awareness of the existence of human *vis a vis* cattle nutrition problems. It may be possible that follow-up research will indicate a probable direction which if rationally pursued will yield an acceptable solution.

OUR COVER

A farmer of PEPSU proudly holds up the soil inversion plough that he uses on his farm. This double-purpose action plough cuts the earth, turns the disturbed soil to one side, covering the row cut on the previous furrow. A plough like this is invaluable for turning in and covering green manures.

Farmers I Have Met



GREEN MANURING SHOWED HIM THE WAY

"FOR the first time, my paddy yields have doubled this year because of my application of a sufficient quantity of green manure for the crop," was what Shri M.B. Bakthavatsalu Reddy, a farmer of Chingelpet district in Madras State, whom I met recently, told me. His maximum yield till last year was 15 bags (about 2,400 lb.) per acre, whereas his current year's yield amounted to 31 bags (about 5,000 lb.) per acre.

Narrating the various methods he had been trying to improve yields during the last few years, Mr. Reddy said that green manure succeeded as nothing else did, and he got this phenomenal increase this year. He cited examples and said that application of green manure in abundance at the proper time would increase the yield not only of paddy but other crops as well. " This, however, does not mean that I have lost faith in the efficacy of fertilizers ", he hastened to add.

Sesbania, according to Mr. Reddy, has proved to be the most effective green manure. Apart from growing this plant on the farm bunds, he has specially set apart a portion of his 20-acre plot to grow green manure. This, he said, was to ensure a continuous and plentiful supply. Moreover, compared to fertilizers, green manure is cheap.

Mr. Reddy firmly believes in adopting improved agricultural methods and follows the suggestions offered by the Agricultural Department in all his farming operations. This, he assured me, has always been to his advantage.

Apart from paddy cultivation, Mr. Reddy also grows commercial crops like vegetables, bananas, etc.

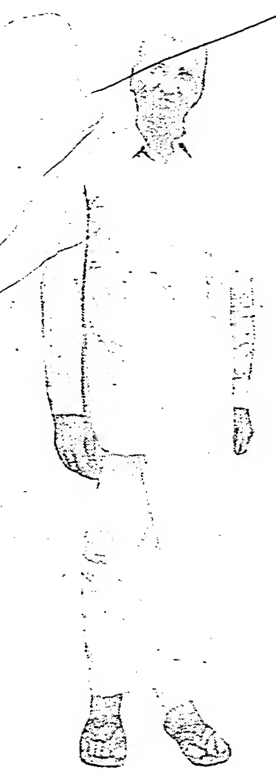
He maintains a team of eight permanent workers and looks after their welfare. When the farming season starts, casual labour will be recruited to supplement the permanent labour employed by him.

Mr. Reddy, who is 45, is a matriculate and his sole occupation is agriculture. He has entered the crop competition to be held next year and hopes to get a prize.

As he gets sufficient water to irrigate his farm from the farm-wells, failure of monsoon will not upset his farming operations. " But rainfall at the appropriate time is like application of an extra dose of fertilizers ", thinks Mr. Reddy.

—K.E.S.

Man of the Month



Shri Balasubramania Iyer

DURING the days of food shortage in India, Prime Minister Nehru used to define a patriot as 'one who made two blades grow where one grew before'. Judged by this definition, Mr. Balasubramania Iyer, Headmaster, Sir P.S. Sivaswami Iyer High School, Tirukattupalli (Madras State), is more than a patriot, for he makes many blades grow where none ever grew before.

Tirukattupalli is a small village in Tanjore district which is called the 'granary of South India'. The village is reached by bus from Budalur, a station on the Southern Railway, and five miles from it.

While making his usual stroll on the Tirukattupalli-Budalur road one evening, Mr. Balasubramania Iyer's eyes fell on a piece of undulating land, nearly 30 acres in extent, lying fallow and surrounded by green paddy fields. On a closer examination of the land, he found that only a few *babul* and palmyra trees grew on it and that all other forms of vegetation were absent. He made enquiries regarding the ownership of the land and learnt that it belonged to the Madras Government. On his return, he felt that the land instead of lying fallow should give place to something that would make it a proud possession for its owner.

HEADMASTER turns farmer and conquers alkali too

by
K. VEDANTAM

Schoolboys planting paddy on the School farm, with the Headmaster (right) giving them the right directions

With this in view, he addressed the Government of Madras for alienation of the land to the School. In his application, he stated, among other things, that he required the land

(1) to impart agricultural education to boys studying in his High School,

(2) to grow enough paddy to meet the requirements of 120 boarders in the hostel attached to the High School,

(3) to start a model farm for the benefit of neighbouring farmers,

(4) to run a seed farm to multiply improved paddy strains for supply to Government and local farmers, and

(5) to conduct experiments and research.

THE FARM TAKES SHAPE

In April 1947, the land was assigned in favour of the School. The condition of the land, however, was such that reclamation by human labour would have involved much waste of time and money. So Mr. Iyer obtained the services of a bull-dozer from the Agricultural Department and set about reclaiming the land. It was first levelled and then divided into bunded fields. Areas were allocated to grow wet, dry and garden crops.

A fish-pond was constructed to develop pisciculture. Roads were laid to facilitate easy traffic within the Farm and coconut and Glyricidia seedlings planted on either side of the roads. For purposes of summer cultivation, four wells were dug. Sanction of the Engineering Department was secured to use the Cauvery river water for irrigating the fields. All these took nearly six months to complete and cost over ten thousand rupees. Neighbouring farmers who watched the operations smiled at the efforts of the Headmaster and often wondered whether he was not a 'lunatic' in thus wasting money (bequeathed to the School by a great man) to improve land that could never be improved.

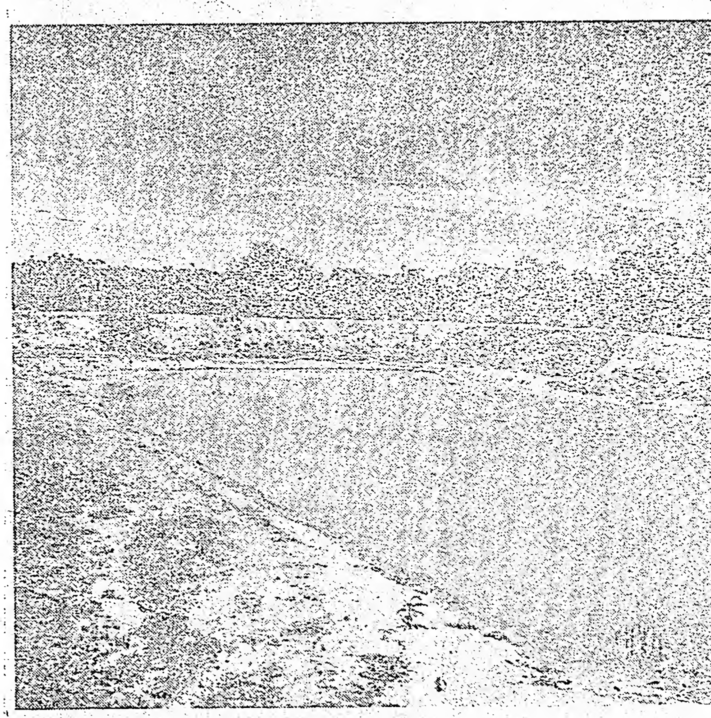
A land that was never cultivated was for the first time brought under paddy in 1948. The Farm was christened Sivaswamipuram Farm, in memory of the founder of the School.

To fertilize the fields, compost from the local Panchayat Board was purchased. This was supplemented by a few cartloads of green leaf manure. The maiden attempt resulted in a grand return of ten bags of paddy from 30 acres! In other words, the yield per acre was 40 pounds. Neighbours smiled to see their prophecy come true.

Mr. Iyer, however, did not lose heart. He consulted agricultural officers to find out the reasons for the poor yield in his farm and was told that the soil was very alkaline. He took samples of the soil and sent them to the Government Agricultural Chemist, Coimbatore, for analysis. The Chemist's report stated that the soil had a high concentration of salts and suggested remedies to overcome the defect. These, in essence, were:

Puddling the rice fields—this nice looking field was once a waste land

The fish pond attached to the School shows people how ponds can be put to a good use



(1) provision of drainage facilities which the fields lacked for the removal of salts in solution,

(2) periodical removal of salt encrustations appearing on the surface of the soil when soil moisture got evaporated,

(3) addition of gypsum at the rate of half a ton per acre to neutralize the action of certain injurious salts,

(4) addition of large quantities of tank and river-silt,

(5) growing of saline-resistant paddy varieties, and

(6) addition of plenty of organic matter in the form of cattle manure, compost, cakes and green manure.

The dairy which he started in the hostel to meet the milk-needs of the boarders provided about 300 cartloads of cattle manure. Farm refuse, school and hostel sweepings, etc., went into the compost pits and yielded about 300 cartloads of compost manure. The Glyricidia trees grown along the roads in the Farm yielded a good amount of organic matter. Sesbania seedlings planted alongside the bunds of paddy fields simultaneously with the transplanting of paddy seedlings, furnished enough green manure for the succeeding paddy crop. Crops like indigo, sannhemp and *dhaincha* grown in the Farm during the off season also provided much of the green manure requirements of the Farm.

INCREASE IN YIELD

The cumulative effect of the adoption of these measures resulted in an increased yield of 160 bags of paddy in 1949, the second year of trial. The land got improved a great deal. Two years of practical experience, frequent contacts with agricultural officers, visits to neighbouring Agricultural Research stations, voracious reading of books on agricultural and allied subjects—all these had their effect on the Headmaster, now an amateur agriculturist.

Mr. Iyer now turned his attention to the use of chemical fertilizers for his crop in conjunction with organic manures. He found that a dose of 100 pounds of superphosphate applied at the time of transplanting followed by 50 pounds of ammonium sulphate after the first weeding and 50 pounds a fortnight before flowering, resulted in higher yield. During 1950-51, the Farm-yield rose to about 400 bags. The very ryots who scorned his attempts to reclaim alkaline land in 1948 were first to congratulate him on the success achieved.

In the succeeding years, Mr. Iyer renewed his efforts to further increase the yield. For this, he used some of the best paddy strains evolved by the Agricultural Department. Co. 25, a strain resistant to blast disease and a high yielder, became his favourite strain. The yield was gradually pushed up to about 600 bags at which figure it now stands. Mr. Iyer has fixed his target at 1,000 bags.

In two successive seasons, Mr. Iyer tried the Japanese method of rice cultivation. There was a small increase in the yield but the phenomenal increase associated with the Japanese system was not in evidence probably because alkaline soils do not tolerate heavy applications of chemical manures.

The Madras Government appreciated his efforts and offered him a number of prizes for outstanding contribution to better farming. They registered the Farm as a model one. They regularly purchased his paddy and green manure seeds.

To make the Farm up-to-date in every sense, electrical connection was secured to work the pumps in the Farm. These bale out water during summer when crops like *cholam* (*jowar*), maize and *ragi*, which tolerate alkalinity to a certain extent, are cultivated.

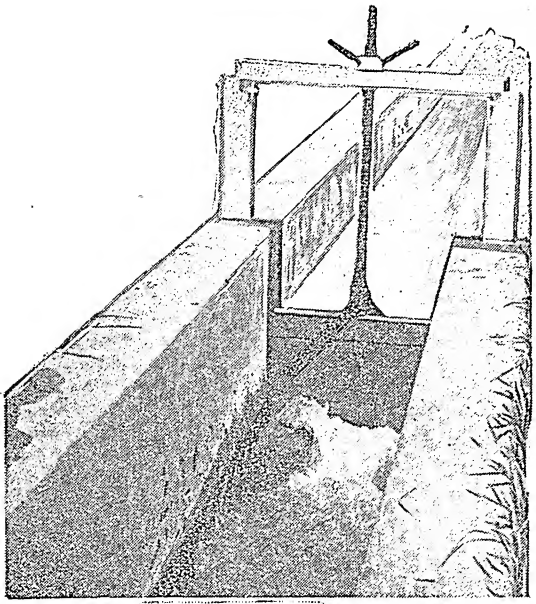
NEW VENTURES

The need to attain self-sufficiency in the matter of food (apart from paddy and milk which were already being produced in sufficient quantities) inspired him to enter on new ventures.

About nine acres of Government land lying on the banks of the Cauvery river were taken on long lease and reclaimed with the aid of a tractor by Mr. Iyer. The vegetable needs of the hostel are met from the supply of this farm. All varieties of vegetables are grown there. To meet fuel needs a small *casuarina* garden has also been planted. In the campus of the School nearly nine acres in extent are grown with coconut and citrus trees. To the School is attached a small apiary to teach bee-keeping to boys. To meet the needs of the Dairy and to improve the quality of milch animals of the locality, a Sindhi breeding bull and a Murrah buffalo stud are also maintained in the school campus.

Mr. Iyer, 61, is very tall—about six feet. He is sixty-one but does not look it. He believes more in doing than in talking and hence talks little. He is happy in the company of the young for whom he lives and works. He is very strict in his dealings but that does not prevent him from being liberal when necessary. He is a very hard taskmaster but that does not prevent him from appreciating good work done by his assistants in the School and in the Farm. His two sons want him to retire from active life and enjoy a well-earned rest. But to them the man says, "No". He wants to serve national interests as long as he can. His devoted wife assists him and shares the pleasures and pains of a Headmaster turned farmer.

Today the Sivaswamipuram Farm is a place of pilgrimage to officers of the agricultural, veterinary, revenue and engineering departments, to farmers of the neighbourhood, to students of agriculture and to many others who like to see good things done in a better way.



WASTE WATER

NOW HELPS RAISE MULTIPLE CROPS

by

T. C. Roy

HOW proper planning and development of existing material resources can, with the co-operation of all concerned, be harnessed for collective welfare is being demonstrated in the fields at Chandrahati, a place about two miles from Tribeni in Hooghly district, West Bengal, which stands on the confluence of the Saraswati, the Jamuna and the Ganges.

The fields, which were entirely at the mercy of the rains, are now yielding two or three crops a year, and crop failure, which was not uncommon in the locality, has become a thing of the past.

The scheme is to make full use of the effluent water of the factory of Messrs. Tribeni Tissues Ltd., hitherto running waste to the Ganges, for irrigating the agricultural lands of the neighbouring seven *mouzas* of Raghunathpur, Benipur, Madhusudanpur, Tribeni Baikunthapur, Demra, Raghabpur and Gopalpur, covering an area of about 800 acres.

A triple alliance of cultivators, the Mill authorities and Agricultural Officers of the State Government has made the utilisation of effluent water for irrigation a reality.

The idea was first mooted out in 1951, during a period of acute drought. The question was taken up with the Mill authorities, who agreed to divert a small portion of the effluent to the fields of neighbouring farmers. Encouraged with the results achieved during the year, cultivators of the area formed a strong committee, including the Mill Manager and the Subdivisional Agricultural Officer, Hooghly, to devise ways and means for efficient utilisation of this effluent water.

A complete contour survey of the area was undertaken in the following year, and small irrigation-cum-drainage projects drawn up on the basis of this survey. The speed of effluent was such as to scour away a considerable area. It was, therefore, necessary to construct *pucca* channels to minimise the speed of the running water before actually releasing it to the fields, and as such an irrigation scheme was also drawn up. Work on the Scheme started early in 1953 and was completed by the spring of the year.

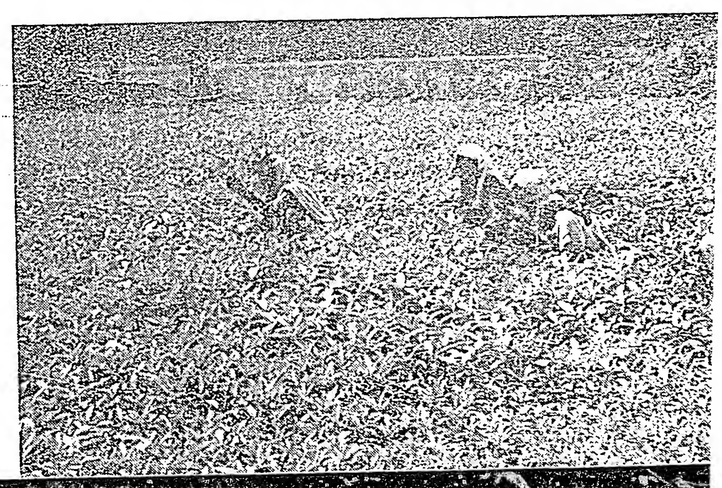
Thus the Madhusudanpur Drainage Scheme, popularly known as the 'Trifasali Khal', diverted 15 to 20 lakh gallons of water per day otherwise running waste to the Ganges to the fields.

Out of the total cost of Rs. 4,821 a third was borne by the beneficiaries and the remaining two-third by the Government.

The water not only ensured against crop failures in the area, but has also provided an opportunity for double, and even multiple-cropping. Widespread demonstration was organised for double and multiple cropping, such as the growing of jute and *aus* paddy followed by *aman* onions and *khesari*. Cash crops like sugarcane and potatoes and green manuring crops were also grown. Triple-cropping, as the name of the Khal implies, was the objective. In the first year (1952-53), 21 *bighas* were put under triple-cropping. In 1953-54, the area under triple-cropping increased to 210 *bighas*.

About 600 *bighas* were double-cropped. All the plots in the commanded area, comprising 800 acres, are expected to be double-cropped. From a plot-to-plot survey for assessment of the benefits accrued, it was found that the value of the extra yield obtained was to the tune of Rs. 1,23,090 during the two years under cultivation.

A good crop of jute raised on effluent water and (above) one of the channels built to regulate the speed of water



KEEP THE POTATO MOTH OUT

Research leads to new, surer method of control

by

A. C. SEN

Frequent irrigations help reduce pest attack. Below, a potato field being irrigated

POTATO-GROWERS in Bihar have now some efficient methods to control the potato moth which does a great deal of damage to the crop in the field and the store, as a result of research conducted at Sabour under a scheme financed by the Indian Council of Agricultural Research.

The findings of the research conducted are of great practical utility to the farmers in Bihar. The State has 95,000 acres under the crop each year, which is a quarter of the total potato area in the Union, and produces a fifth of the total potato produced in the country.

Estimates show that from 25 to 70 per cent of the potato is damaged in the store due to the pest. Under field conditions, the pest mines into the leaves and destroys young plants. Though the moth breeds practically throughout the year, it is seen most by the end of February, when almost every plant in the field is found infested. The moth gets ample chances of laying eggs in the tubers before they are dug out and transported to the godown. At least five per cent of the tubers get infected at this stage, and this is how infection is carried to the store.

It is advisable to check this infection right in the field itself. This can be done by resorting to several steps, the first being irrigation. Frequent irrigations check formation of cracks and crevices, and make the soil impenetrable to the pest. Investigations show that eight to ten irrigations produce the desirable results.

Thorough and timely earthings up prevent infestation of tubers by filling up cracks and crevices in the soil, and giving less chances for the pest larvae to bore inside and attack newly-formed tubers. Two to three earthings serve the purpose.

When the crop is about two and a half months old and leaves start drying up, it is the best time for harvest. As the pest population is small at this stage the infestation of harvested tubers is also very small.

Dusting the infested field with two per cent DDT at 30 lb. per acre, or spraying with DDT. 0.125 per cent (water dispersible) at 100 gallons per acre affords considerable immunity from pest-attack, and this insecticidal treatment can be resorted to by all farmers.

Under storage conditions, most of the damage is caused during April to July. In case the tubers are stored under sand, the moth lays eggs on the sand or on the wall or floor of the godown, instead of in the eyes-buds of the tubers. Caterpillars that hatch out find their way through the sand to the tubers. The field is not infected because of infected seed. The moths themselves begin to quit the godown by the end of September and establish themselves in the field on young brinjal, tobacco or tomato plants before migrating to the primary crop.

From the field, though the pest is generally carried to the store through infested tubers at the time of harvest, occasionally the moth also flies from the neighbouring fields to the godown.

Observations show that the activity of the moth is checked in broad daylight as well as in complete darkness, while maximum activity is during the dark out-

doors and in diffused daylight under godown conditions.

The eggs show a very low viability, varying from 30 to 40 per cent when laid on a place like the verandah where there is free movement of air. The highest rate of multiplication was found at a temperature varying from 86° to 100° F.

A godown, measuring 18 ft. × 16 ft. × 18 ft., and receiving daylight from two openings of about one square foot each with cross ventilation arrangement, is sufficient to keep the activity of the moth under check.

As the control of the pest in the store has a direct correlation with its control under field conditions, it is essential to take necessary precautionary measures from the time the potatoes are in the field.

CONTROL IN THE GODOWN

From the experience gained, certain measures will have to be undertaken to control the pest in the godown. Potatoes which are mechanically injured or which have black spots on their eye-buds should be rejected. Sorted out potatoes should be treated with one of the following disinfectants to kill moth eggs laid on the eye-buds of the harvested potatoes: (a) sanitary fluid one per cent, (b) potassium permanganate solution 0.5 per cent, (c) bleaching powder 0.3 per cent, (d) pyridine dust two per cent and (e) pyrethrum emulsion 1.5 per cent.

Godowns for storing potatoes should be straw-thatched, preferably with dry *kacha* (mud-plastered) walls and floors, and provided with arrangement for cross ventilation. The plinth should be at least one foot above the ground. The godown should be such as to remain protected from the direct heat of the sun and the temperature may not exceed 70° F. The inner walls of the godown should be sprayed with 1.5 per cent DDT (water dispersible) at intervals of three months. This has been found to keep down the pest infestation to an appreciable extent.

A raised platform of mud about six inches high should be built in the godown and plastered with a mixture of mud and cow-dung, and left to dry thoroughly; or *machans* may be prepared in the godown in the form of shelves along the wall. Shelves can be made of a simple design by means of bamboo-sticks and palm-leaf mats supported on strong bamboo or other wooden poles. They are to be kept two feet apart from one another.

COVERING MEDIUM

Coarse river-sand, thoroughly dried and cooled, has been found to be the best covering medium for storing potatoes. This should be spread either on the raised platform or on each shelf to form a bed of about one inch in thickness. The topmost shelf should be kept about six feet below the ceiling.

The potatoes can also be intermixed with garlic bits at the rate of four chhataks per maund of potatoes and then covered with the sand so as to make the top layer one inch thick. It has been found that when the thickness of the top layer of the sand is two inches or more, it induces rot. It has also been found expedient to keep crushed garlic bits spread on this top layer of sand.

The potatoes should either be dusted with five per cent BHC or DDT at two ounces per maund and then stored either on the raised platform or on *machan*, exposed or under sand-covering, as described. The insecticide should be mixed with either talc or dry earth and sprinkled evenly on the tubers kept in separate containers.

Many farmers in Patna have been getting excellent results by using very small quantity of the insecticide, say, one pound in 40 maunds potatoes, by thoroughly mixing the insecticide with finely ground red earth and spreading it over the tubers so as to give a good coating.

OPERATION REPEATED

This operation is repeated three times during the storage period. The heap should be examined from time to time and any cocoon or caterpillar of the pest that may be found should be removed along with the affected tubers. During the monsoon period, the stored potatoes should be taken out from beneath the sand and kept in baskets or on *machan*. This practice reduces the percentage of rottage to a great extent.

The potatoes thus treated should be used for seed purposes alone, as the use of chemicals on potatoes meant for consumption is not advisable from the health point of view.

The kerosene oil trap has also proved very effective in destroying adult moths. It consists of an earthen basin of 18 in. diameter containing water with a film of kerosene oil (50:1) on its surface. It should be used during the day as well as night in the potato-stores, but in the field it should be used only during the early evening hours. At the end of every week, the water in the basin should be changed. A large number of adult moths are attracted to the trap and are killed.

A complete cultural and manurial programme for the coconut garden

COCONUTS— more, bigger, better

AT the Central Coconut Research Station, Kasaragod, it was found that intercultivating the coconut garden alone without any manuring increased the yield of nuts by about 170 per cent, while the yield of trees in the uncultivated and unmanured fields declined by seven per cent every year.

This is only an indication of how the cononut palm responds to proper cultural attention paid to it. In fact, with a proper manurial and cultural programme for the existing coconut area in the country, we can easily upgrade production to meet our coconut requirements.

Coconut experts are recommending a schedule which includes manuring, intercultivation, irrigation and control measures for pests and diseases for raising the yields of coconuts.

In a normal coconut palm growing under suitable conditions, there is a continuous process of fruit production, and in the course of a year, there are about ten harvests. The coconut tree, therefore, steadily utilises food material from the soil which results in depletion of plant foods from it. It is estimated that in an acre of coconut garden which yields about 2,000 nuts per year, there is a loss of roughly 18 lb. of nitrogen, 5 lb. of phosphoric acid and 38 lb. of potash. This, therefore, calls for a regular and judicious application of manures.

The coconut responds to the application of nitrogenous, potassic and phosphatic manures, and more so in less fertile or poor soils. The response is seen more in the case of potassic and nitrogenous fertilizers.

The coconut should get 0.75 to 1.50 lb. of potash per tree per year. This may be applied in the form of 20 to 40 lb. of ash or one and a half to two pounds of muriate of potash or potassium sulphate. It should get nitrogen at the rate of 0.5 to 1.0 lb. per tree per year, given in the shape of three to four pounds of ammonium sulphate or 15 to 20 lb. of groundnut or other oilcakes. Phosphoric acid should be applied at the rate of half pound per tree per year. This may be done by

applying two pounds of bone-meal or superphosphate.

Artificial fertilizers, to be effective, should have enough organic matter in the soil. The organic matter is also essential to maintain soil texture and retain moisture. A great majority of our soils in which coconuts are grown lack this organic matter. To improve the situation, farmyard manure, compost or green leaves have to be applied in sufficient quantities. Farmyard manure or compost can be applied at 100 lb. per tree per year and green leaves at 6,000 to 10,000 lb. per acre. The easiest method, probably, to increase the organic matter of this soil is to grow a green manure crop of cow-gram, sannhemp and *dhaincha* or wild sannhemp and apply it into the soil.

Locally available manures such as the fish guano and prawndust are good sources of manures containing more than one manurial constituent and can very well be used.

COCONUT HUSK

Coconut husk is rich in potash, the most important manurial requirement of the coconut palm. In places where the husk is not used for extracting fibre from it and is cheap, it can be buried in trenches between rows of palms at the rate of 500 to 1,000 husks per palm.

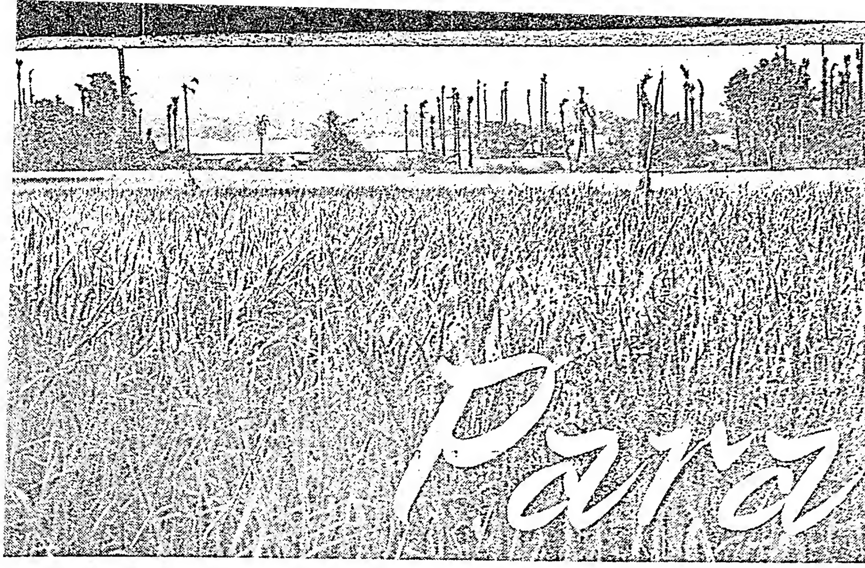
Intercultivation in coconut gardens is of great importance. Digging the garden with spades or digging fork, ploughing, forming small mounds in August-September and spreading the mounds in December-January, or making shallow basins to a radius of about five feet at the beginning of the monsoon and filling them up at the close of the monsoon are some of the practices widely followed and recognised as highly beneficial to the trees.

Production of nuts decreases if moisture is inadequate, especially so in plantations of sandy or sandy loam soils. Irrigation at proper intervals during the summer months is, therefore, advisable. Incorporating green manure crops or burying husks helps increase the water holding capacity of the soil and reduce the frequency of watering.

PEST CONTROL

Pests like the rhinoceros beetle and the leaf-eating caterpillar are serious pests of the coconut palm and are responsible for lowering the yields. The beetle should be extracted from the crowns of the palm with the aid of a beetle-hook and its breeding places, such as the manure pits and rubbish heaps, treated with BHC to destroy its grubs. The leaf-eating caterpillar can be controlled by natural parasites which the Agricultural Department of your state will do for you. The leaves of affected trees should be sprayed with DDT.

The leaf-rot disease is widely prevalent in many parts of the country and reduces coconut yields considerably. The disease can be controlled by spraying the crown and the leaves with one per cent Bordeaux mixture. The spraying should be done on a large scale. Each palm should be sprayed thrice, once before the onset of the south-west monsoon, a second time between the south-west and north-east monsoon and a third time after the north-east monsoon. Better cultivation and liberal use of potassic manures also reduce the incidence of this disease.



If you have enough rainfall or a swampy bit of land, try this fodder

Para Grass

A NATURALLY occurring grass, easy to cultivate and replace and supply a heavy yield of green fodder all the year round is being largely grown by dairy farmers in Bombay State.

The grass goes by the name of 'para grass' or mauritius water grass (*Panicum muticum* or *P.molle* or *P.barbinode*) and has been found to yield 13 to 15 tons of fodder to the acre. It is palatable as well as nutritious to cattle. It has also been found to be a good soil-builder. It is, however, suitable only to swampy and heavy rainfall areas.

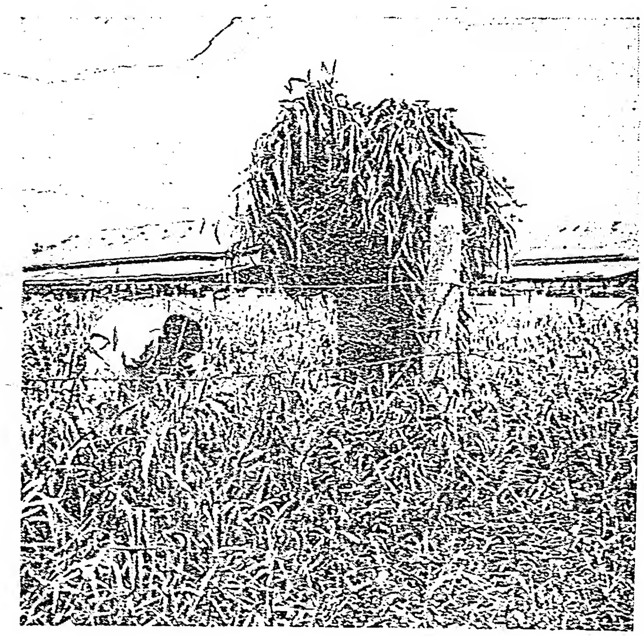
In Bombay, the grass has been found suitable for growing in the medium soils in areas of heavy rainfall. The grass is very much relished by cattle when it is young.

In Madras State, the grass has assumed an important place among fodders grown in marshy areas and under irrigated conditions. The grass is also grown abundantly for fodder on the livestock farms of Assam.

Para grass, in view of its potentialities, has been also tried on various state farms for trial with very encouraging results. In Bihar, the grass showed a very luxurious growth during the monsoon and has been responding very well to application of both organic and inorganic manures.

In Coorg, the grass showed a profuse growth. In summer, it was found to be a good cover crop and being spreading in its nature was found to prevent soil erosion. The grass has been found quite congenial to the soil, climate and rainfall of Manipur State where it has been giving a luxurious stand.

In Uttar Pradesh, para grass was found to be a very good grass but its liking for swampy or water-logged conditions will limit its wider use in this State. Rainfall in the State is restricted only to three months in the year. Trial with this grass in Hyderabad State also has given equally encouraging results. Here, it is found to respond very well to heavy irrigations and manuring.



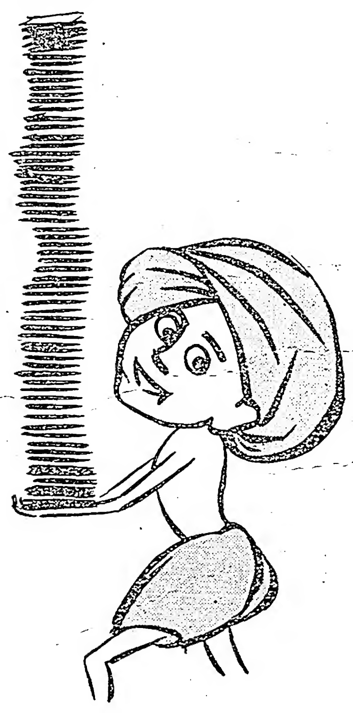
Para grass being cut and transported to feed cattle in one of Bombay's dairy farms

MAKE THE WRITTEN WORD WORK FOR YOU

Ways of telling a story and telling it attractively

IN helping villagers solve their problems it is advisable to make adequate use of all respectable newspapers and other periodicals reaching the villages where you work. The material that you contribute in these papers need not necessarily be news because many papers or periodicals going to villagers welcome even 'service-type' information, and this is the main type of message that you will have though in your work you occasionally make news and the paper will want to use this news.

However, it is well to give anything you write a 'news slant', if possible. For instance, if you are convinced that a locust invasion is likely, you will want to run a story on what local farmers should do when the locusts come. It would be proper in that case to outline each step that must be taken by the farmer in order to protect his crops and the community from these insects. The story can be made more interesting by pointing out in the very beginning that locusts are likely to come in the very near future, telling the source of your information, if possible.



The story that you prepare should be written in the language of the village people who are reading the story, and in a way that they can easily understand it. The sentences should be crisp and paragraphs short. Moreover, all the details given in the story should be accurate. Timely publication of the story will further enhance its value. Since most of your stories will be the 'how-to-do-it' type it would be appropriate to tell the story by telling how some villagers succeeded with the improved job or practice at home. In any case, all stories that you prepare for the papers should be written to help people in your villages. Only rarely you might write a story which simply reports community activities such as a meeting, but even in this case the meeting will have been held to help solve some village problem.

KNOW YOUR EDITOR

If possible, you should acquaint yourself with the editors of all the papers coming into your villages. In case you do not think it possible to prepare stories yourself for the paper, let your editor know your problems. It is very likely that he will try to impress upon you that writing for the newspaper is not difficult for a literate man. Having got acquainted with your editor and having received his assurances that he would be interested in your material, prepare a brief story and let him look at it. If he does not accept the story straightaway but he is interested in serving his readers, he will tell you his reasons for not accepting the story and how you can prepare another story that he will accept. It is almost universally true that after a short period of introduction, alert newspaper people will seek the village worker and insist that he continues giving material for the papers. Sometimes the editor will become so interested that he will prepare much of the material himself. In the beginning, however, the village worker must take the initiative.

If a village worker is in villages that do not have enough newspapers for his use, he will be doing a service to his people if he introduces good rural magazines or papers. There are a number available, written in simple local language that can help the village worker do his job better.

In teaching, literature is the basis for any teaching programme. In Extension teaching, simple leaflets and pamphlets are valuable and essential tools in

the hands of the intelligent village worker. The leaflet, in India, is a single sheet of paper folded to make a four-page piece of printed matter. However, a leaflet can be printed only on one side, printed on two sides of folded sheet, or folded five or six times with printing on all sides. The leaflet usually treats one job or one small problem; it gives a process, or procedure in great detail. The best leaflets are those which give accurate and specific instructions on how to do a job.

BRIEF AND SIMPLE

A pamphlet or bulletin, on the other hand, may contain many pages and treat a number of topics or steps in a given problem. The best pamphlets are brief and simple and without such information as would be irrelevant to the problem treated.

The village worker should make every effort to obtain as many pieces of literature for his use and reference as possible. If arrangements can be made, enough copies of the same circular or leaflet should be secured for passing around or lending these on to the interested villagers at each meeting or demonstration. In case it is feasible and practicable for him to have leaflets printed or cyclostyled for his own use in the village, the simple rules given hereafter may be followed. It is hard to write for easy reading. But it has been proved in many reading tests that the easier your writing is, the more it will be read.

Only one simple idea, such as fertilizing sugarcane or using the best wheat seed or selecting laying hens, should be treated in a leaflet. Only those subjects or jobs that are of interest to the villager should be selected. In writing a leaflet, the villagers' language should be used. The paragraphs should be short and too much material should not be crowded on a page. Make sure that your longest sentence is not over 15 words, average sentence has 10 words or less and most of the words in each sentence are of one syllable, few of them, if any, being over two syllables. Illustrations and pictures which are easily understood may be used. The instructions given in the leaflet should be complete, yet simple, and should be thoroughly checked for accuracy.

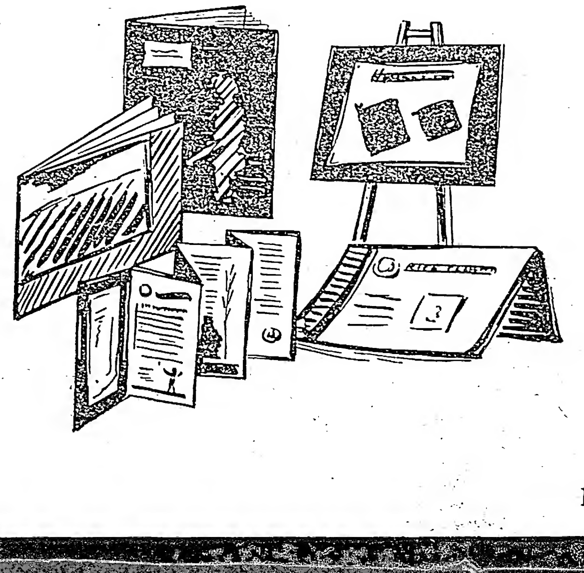
CIRCULAR LETTER

One of the best teaching devices that can be used is a circular letter, a letter which is reproduced and sent with the same information to many people. To village people, even partly literate, receiving a letter can be very important. Naturally, receiving such mail will have great influence. However, the value of a letter will depend mostly on how well you write it.

The best letters will be brief, simple, clear and have a single purpose to convey. They should have complete information and be an effective part of your programme or campaign, and lead to action. So they must have short sentences and short paragraphs, with a personal touch in them. The reason for a personal touch is that the reader will be more interested. This interest can be aroused in many other ways, but each letter must arouse interest, possibly in the first sentence. For example,

> "Dear Friend,
>
> I notice that you attended our meeting last week. In this meeting we discussed controlling mosquitoes. A number of suggestions were made. One suggestion, as you may recall, was to clean the tank and place in the tank young fish. These fish will eat mosquito eggs. This will cut down the number of mosquitoes. In this way we may control malaria. Your committee has decided to meet again next Friday at 7'O clock. At this meeting we will discuss ways to clean the tank. Would you come and give us your ideas?"

Circular letters can teach and save time for the village worker. They can be inexpensive, if their production and despatch is planned properly. If you cannot get a cyclostyling machine, enlist the assistance of the school master. He can allow his students to copy your letter and pass them out to the villagers.—*From the forthcoming publication "Extension Guide for the Village Worker"*



Well-rounded, closely-formed curds of an attractive white colour and magnificent quality—this is what the new variety offers you

the new cauliflower with a future

by

H.B. Singh and S.M. Sikka

VEGETABLE-GROWERS in northern India will now be able to raise a crop of cauliflower early in the season, thanks to the efforts of the Indian Agricultural Research Institute, New Delhi. A new early variety of cauliflower, yielding well-rounded, closely-formed curds of an attractive white colour and excellent quality, has been recently evolved at this Institute.

An outstanding feature of this variety, which closely corresponds to the commonly grown *Katki*, is that the proportion of poorly-heading plants is negligibly small, and an average curd weighs two and a half pounds, though curds weighing four pounds have also been obtained. Another important characteristic of this variety is the uniformity in the emergence of the curd.

Cauliflower is extensively cultivated in northern India as an important vegetable crop, so much so that cauliflower produced in this part of the country is marketed to places as distant as Calcutta and Bombay. The profitable growing of cauliflower, as also of other vegetables, however, depends a great deal on raising an early or a late crop. The production of an early crop is even more important because by doing so the vegetable-growers can realise a much higher market price for their produce.

METHOD OF CULTIVATION

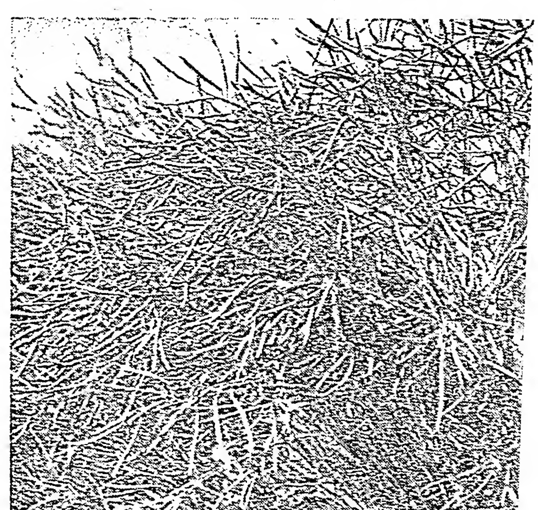
The nursery of this variety is sown in the month of July on raised seed-beds which are heavily manured with well-rotten cow-dung. A convenient size of the nursery bed is 15 ft. × 3 ft. Generally six to eight ounces of seed is enough to raise a nursery for planting an acre. The seed should be sprinkled uniformly over the seed-bed, the surface of which has been well compacted, and thereafter covered with a very thin layer of a mixture of fine earth and sifted farmyard manure. The seed-beds should be kept moist by sprinkling water with a rose-can once or twice daily, depending on the weather. It is desirable to provide shade during the hotter part of the day in the pre-monsoon period and give protection from heavy rain afterwards. At no time should the seed-beds be allowed to submerge in water, as in that case the young seedlings are likely to be killed.

Compact curds of an attractive white colour are characteristics of the new variety

The seedlings will be ready for transplanting in about four to six weeks after sowing. The field in which the seedlings are to be transplanted should be thoroughly cultivated by ploughing three to four times with a country plough. Well-rotten farmyard manure should be added to this field at the rate of at least 20 cartloads per acre. The seedlings can be transplanted on ridges or in flat beds keeping a distance of two feet from plant to plant and row to row. Addition of ammonium sulphate at the rate of three maunds per acre during the growth period will prove very beneficial to the crop. To get the best results, it is preferable to sprinkle the fertilizer near the roots of the plants at short intervals. In case there is no rain the field should invariably be irrigated after the application of the fertilizer.

Regular hoeing of the crop is of utmost importance to keep down weeds and to loosen the soil. Four to six hoeings before the curd-formation starts are considered adequate. With each hoeing, the lower portion of the plants should be well earthed up. This operation is very essential as otherwise the plants do

The new cauliflower in seed



not become fully stocky. The crop has to be frequently irrigated at intervals of a week to 10 days, particularly during the post-monsoon period.

RAISING SEED

The new variety has been observed to be a good seed-producer under Delhi conditions. Seed can be raised on selected plants which may either be allowed to flower in their original position or transplanted in a separate plot. The latter method is to be preferred as it permits greater care of the plants and also helps in effecting saving in space. If the transplanting method for raising seed is followed, the selected plants should be planted at a spacing of $2\frac{1}{2}$ ft. $\times 2\frac{1}{2}$ ft. Utmost care has to be taken in uprooting the plants selected for raising seed, as any injury caused to the roots adversely affects their growth and subsequent seed-setting.

The developing pods have to be protected from damage by parrots and other birds. The pods should be harvested at intervals soon after they become ripe. This will avoid any loss of seed through natural shattering of pods. The quantity of seed produced per plant varies with the care taken in the initial stages. In the crop grown at the Indian Agricultural Research Institute, the quantity of seed per plant varied mostly from half to three-fourth of an ounce, though from some plants as much as two ounces of seed also was obtained.

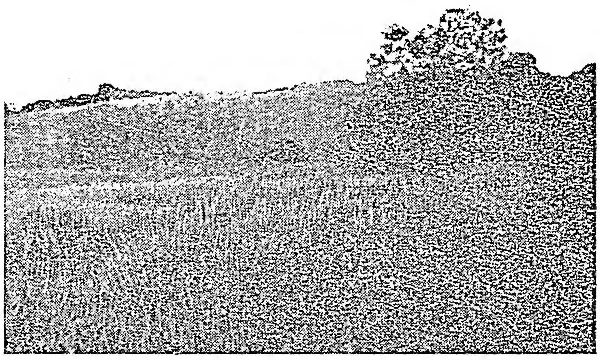
As cauliflower is self-sterile, the home gardener has to take care that he keeps at least two selected plants for raising seed, as otherwise fertilization of flowers will not take place and no seed will be obtained. Another precaution that has to be taken is that the selected plants grown for raising seed should be well isolated from other crops of the mustard family, particularly cabbage and Brussels sprouts with which cauliflower crosses freely. If this crossing is allowed to take place, the plants raised from the resultant cauliflower seed will be characterized by 'bolting', which is a serious defect of this crop.

As a green fodder or hay few grasses can beat

'DAL' GRASS

by

H. N. DEV GOSWAMI



FEW Indian grasses contain about 30 per cent of crude protein at the young growing stage which does not decrease beyond six per cent at its worst stage. It is also doubtful if there is any Indian grass which is 90 per cent edible at its worst stage either as green fodder or hay.

Hymenachne amplexicaulis Nees is one such grass. In Assam, the grass is locally known as *dal*, *karanga dal*, *bhat dal*, *dhuri dal*, *dhop dala* and *tattu*. In Manipur State, it is called *taboo*. It is a perennial short-erect aquatic grass. It shoots up from a creeping root-stock and roots at the lower nodes. The stem and leaves are very soft. The stem also contains a white spongy pith, which is generally used by children for making garlands.

The grass *Hymenachne amplexicaulis* Nees is perhaps indigenous to Assam, where it usually is found to grow in *beels*, *holas* and marshes. It grows well up to two to three feet above the water level, but can thrive even up to a depth of five to eigth feet. During the latter part of the the winter, it goes either dry or remains dormant. With the advent of the monsoon, it shoots from its rootlets and is collected from May onwards. It flowers in Novermber-December and becomes scarce from January. Surprisingly, even at a late-stage in December, the dry matter content of the grass does not increase above 30 per cent, and it contains about six per cent of crude protein and is 90 per cent edible either as hay or green fodder.

Hymenachne amplexicaulis Nees can easily be propagated in the field by its runners or seeds. Propagation by runners is preferable as the grass grows well in a short period. As it roots and shoots from the lower nodes and has a creeping habit, it multiplies itself and covers more area year after year.

For the cultivation of this grass, a low land where water

accumulates during monsoon, should be selected. It may also be cultivated on the edges of fallow tanks. The land should be ploughed twice or thrice in the month of June and should be puddled. In the case of poor soils, 10 to 15 cartloads of well-decomposed farmyard manure may be added per acre. The runners should then be planted at a distance of two feet apart from plant to plant and row to row. In case of cultivation on the edges of tanks, runners may be planted by digging holes. The runners will firmly set within a week or two and will give shoots from the nodes. It will then grow quickly with the monsoon and cuttings will be available after two and a half months of the planting. Successive cuttings may be available after each one and a half months' interval. Three to four cuttings may thus be obtained.

TAKE CARE OF WEEDS

The grass requires not much of after-care. The only care necessary is to keep the area free from the invasion of weeds, especially the water hyacinth, which easily stifles it. Manuring with five to ten cartloads of well-decomposed farmyard manure per acre in the month of January or February each year enhances its growth and yield.

During the year of planting, two cuttings are generally available yielding a total of about 200 to 250 maunds per acre. In the succeeding years, however, the yield generally rises to about 500 to 600 maunds of green grass in four cuttings with 15 to 20 per cent of dry matter. If it is cut only once in October the yield per acre will be about 400 maunds with about 25 per cent of dry matter.

The grass is a common feed for cattle, buffaloes, horses, mules and elephants. In the early stages, however, the grass is not much relished by animals, especially cattle. This is possibly due to the fishy smell which the grass has at this stage. At the prime stage or beyond that the grass is much relished by animals. Buffaloes of the low-lying areas of Assam mostly depend on this grass for the major part of the year. The mahouts are also seen to collect this grass from distant places and in large quantities to feed their elephants. Cartloads of this grass are often found selling in the towns of Assam at not less than a rupee a maund.

If cattle or buffaloes are exclusivele fed on this grass at its early stage, their faeces become loose. This is probably due to the presence of a high percentage of chlorophyll and other colouring matter in the stuff. This can, however, be rectified by adding a few pounds of straw or dried grass to the principal diet. The grass when converted into hay does not produce any bad effects.

RELISHED BY CATTLE

Digestibility trials carried out with this grass at the Animal Nutrition Research Laboratory, Khanapara, Assam, revealed that even at its flowering stage, the grass is much relished by cattle. The animals consumed on an average 2.6 lb. of dry matter per 100 lb. of body-weight. It was found that 100 lb. of the material contained 1.46 lb. of digestible protein and 12.45 lb. of starch equivalent. The grass, therefore, is in no way inferior to many of the cultivated fodders of India such as maize, Guinea (young), Napier, *jowar*, *bajra*, etc., at least in so far its organic nutrients are concerned.

Metabolic experiments conducted with the hay prepared from both early cut and late cut *dal* in the same Research Station showed that both these are much relished by cattle. The animals under experiment consumed over two pounds of dry matter per 100 lb. of body-weight.

The early cut hay was found to contain 7.1 lb. of digestible protein and 32.5 lb. of starch equivalent per 100 lb. of the raw stuff, whereas the late cut hay was found to contain 2.72 lb. of digestible protein and 26.35 lb. of starch equivalent per 100 lb. of the hay. The grass, therefore, is considered superior even as hay to most of the indigenous grasses used for making hay in India.

BETTER AS HAY

The only drawback of the grass is that it is poor in some of the essential nutrients like calcium and even *ad libitum* feeding cannot assure positive balance on adult animals at rest. If, however, it is conserved as hay in the early stage it is found to assure a calcium balance.

The easy propagation, negligible after-care and high nutritive value of the grass *Hymenachne amplexicaulis* Nees, in spite of its low mineral content may be recommended for utilisation as cattle feed both as green (from pre-flowering stage) and hay (at all stages of growth) for economic supply of digestible crude protein to cattle and more especially to milch and growing stock.

WHAT'S NEW IN FARMING

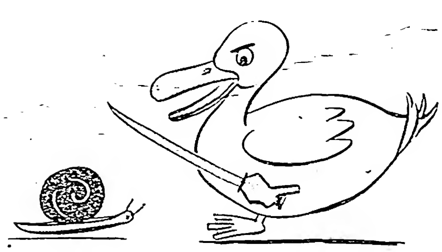
DUCKS CONTROL SNAILS

DUCKS, when reared on the farm, not only add to the income of the farmer, but also help keep some internal parasites of domestic animals away by destroying snails in water sources and other places on the farm.

Snails are carriers of such parasites as flukes, liver flukes and blood flukes, which infect farm animals and cause serious disorders in them.

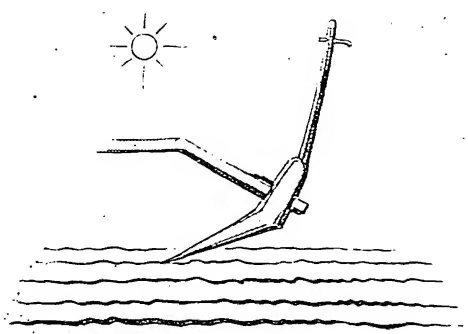
At the Helminthological Research Centre in Madras, it was noticed that when ducks were reared, the snail population went down.

So far, hand-picking and chemical destruction were the two methods prescribed for checking snails on the farm.



DRY-WEATHER PLOUGHING

PROMPT dry-weather ploughing of land has been found to benefit soil and crop to such an extent, that it is being recommended for wide adoption all over the country.



At present, very few farmers resort to dry-weather ploughing. When the monsoon crops have been harvested, land has to be ploughed without any delay to get the full benefits of the operation.

The ploughing not only loosens the soil which otherwise would get hard and unworkable, but also increases the capacity of the soil to absorb and retain moisture. Harmful insect pests and their eggs get destroyed by being exposed to the sun's heat or being eaten away by birds. Weeds also get dried out and killed. And, more important, it permits the farmer to sow his crops at the right time. Sowing in the rainy season can begin in time only if the land has been ploughed and made ready during the dry season. The crop will have sufficient time to grow properly and produce a higher yield.

PERENNIAL FODDERS

THE growing of perennial fodders wherever facilities exist for their cultivation is being pointed out as one sure way of increasing milk output in the country by providing a richer forage to milch cattle.

For growing irrigated grasses, a loamy soil with facilities for irrigation and drainage is best suited. This is what the Madras Department of Agriculture has been recommending to farmers regarding cultivation of grasses:

To get best results, land has to be ploughed four times, twice with an iron plough and the rest with the country plough, to give a good tilth. If necessary, clods should be broken with mallets. Where there is no sullage or sewage irrigation, well-decomposed cattle manure should be applied at 25 tons per acre, spread and covered by working a country plough. When rapid growth is desired, 25 to 50 lb. of ammonium sulphate can be applied through the irrigation water. The soil should be then thrown into ridges and furrows 2½ ft. apart with the help of a ridge plough or with human labour.

The best time for harvest is just before the grass flowers. If too early, the out-turn will be affected and if late, the quality of grass deteriorates. Experience will tell how much the interval between two harvests should be.

The yield of grass improves from the date of first cutting and remains at the same level for six months. A daily supply of grass can be maintained by dividing the plot into strips and cutting the grass systematically at suitable intervals.

GROUNDNUT HAULMS

GROUNDNUT HAULMS can be a good source of forage for cattle. The crop being a legume, is richer in proteins than millets and cereals.

Experiments conducted in Mysore showed that when haulms were allowed to partially dry in the open and then stacked and allowed to cure, a rather dark-coloured hay was produced, highly acceptable to cattle. The hay was found to be as good as of berseem and cowpea.

In curing, it was found advantageous to handle the produce early in the day, and that too as little as possible. Frequent handling in dry weather resulted in the breaking up of tips and the shedding of leaves.

Ordinarily, a dry crop yields 2,000 to 3,000 lb. of haulms per acre, but with the improved varieties evolved by the Agricultural Department in Mysore, higher yields ranging between 3,000 and 7,000 lb. are being obtained.

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MADE IN INDIA

More farmers are taking to Sesbania-growing as a cheap but efficient method of manuring crops

Nothing To Beat Sesbania

by

P. Y. CHINTAMANI

SINCE the last two years, farmers in Madras State have been sowing sesbania (*Sesbania speciosa*) as a green manure on an unprecendented scale.

For doing so, they have a good reason. Sesbania has been giving high per-acre yields of the green matter, averaging from 30,000 lb. to 50,000 lb. The highest yield was 86,400 lb. per acre recorded at the Agricultural Research Station at Samalkota. It is claimed that 10 lb. of seed sown in an acre gives enough green manure for six acres of paddy land.

During 1952-53, when the south-west monsoon was a failure and a severe drought prevailed, paddy lands in Peddapuram (East Godavari) were scorched, but the sesbania plants raised on the field bunds showed no effect of the drought. Experience elsewhere has also been similar. Sesbania is not only drought-resistant, but also has another happy trait. It withstands prolonged submersion.

Sesbania first came to Madras State in 1935-36. The small quantity of seed received from the Economic Botanist, Kew Garden, London, became the nucleus for rapid multiplication for trial on the State's research Stations.

SLOW IN EARLY STAGES

Sesbania has a slow growth in the early stages and after a month it grows faster if moisture is available in the soil. Because of its slow growth in the early stages, it gives smaller quantity of green leaf if cut at this stage. It yields well, however, if a longer interval is given. At the Agricultural Research Station at Maruteru, sesbania gave as much as 25,000 lb. of green stuff in 80 days' time.

The crop is neither well-relished nor grazed by cattle as they do on *dhaincha*. Sesbania rots quicker than *dhaincha*. It comes up better in alkaline soils than *dhaincha*. Under such conditions, sesbania gave 11,000 lb. of green matter as against 9,000 lb. of *dhaincha* at Maruteru. As an off-season crop, it proved superior to indigo and wild indigo.

Another point in favour of sesbania has been its low cost of production. At the Maruteru Station, the cost of production of 1,000 lb. of green leaves worked out to Rs. 0-2-5 to 0-3-6 for sesbania, while it was Rs. 1-0-4 to 1-7-0 for sannhemp, Rs. 0-15-9 to 1-0-6 for *dhaincha* and Rs. 0-4-7 to 0-4-9 for *pillipesara*.

Farmers are very much impressed with the performance of sesbania and, as advocated by the Agricultural Department, are raising the plants on the field bunds. Since the seed coat of sesbania is rather hard, germination becomes rather slow, taking five to six days for the process. However, pounding the seed after mixing it with some sand is supposed to facilitate early germination. I found that if the seed is tied in a cloth and immersed for five minutes in water brought to the boiling temperature and removed from the fire, then dried over-night and sown the next morning, the seed not only germinates by the third day but also gives a good germination percentage.

PLANTING SEEDLINGS

From the experience that I have had of sesbania in Peddapuram, I can say that not only the age of seedlings but also their size at planting time has a bearing on the growth and production of seed. By sowing the nursery thin and planting two-month old seedlings of about a foot in height, best results are obtained.

Sesbania seedlings planted along with paddy do come up very well, giving profuse branching and good podding. For this purpose, sesbania nurseries should precede paddy nurseries by two to three weeks.

When three-month old and about three feet high seedlings were topped and planted, a few did not get established, while the rest branched profusely and gave a good yield of seed. This shows that topping the seedlings after they are a foot or more taller than the paddy crop may be tried with success.

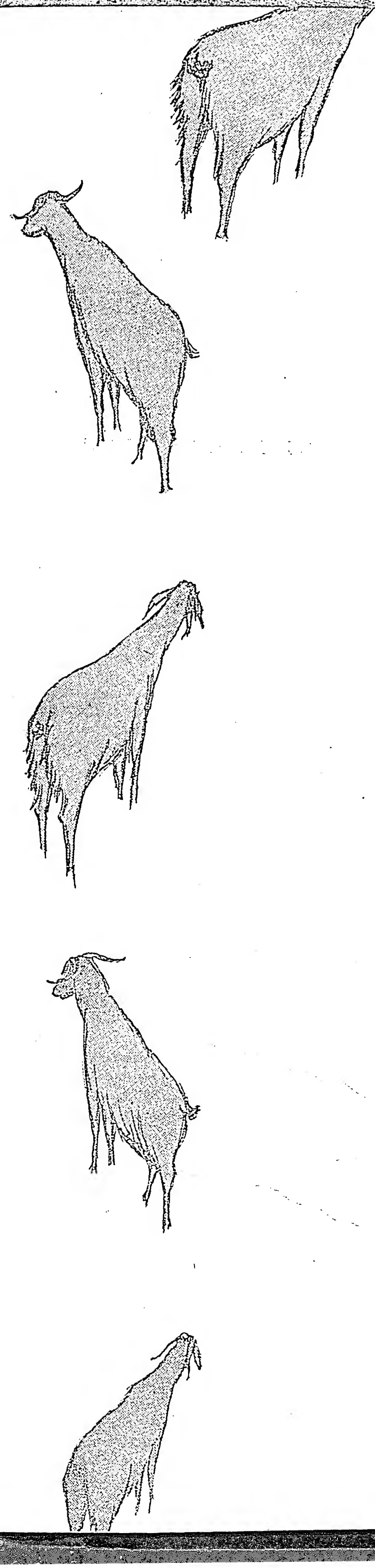
The viability of the seed seems to be very good. In course of time it is likely that this crop becomes a self-sown crop.

Sesbania, excepting for its slow growth in the early stages, has many advantages over other green manures. The following are some of the important recommendations being made by the Madras Agricultural Department.

In single crop wet lands, sow 10 to 15 lb. of seed a week or ten days before the harvest of paddy. This gives sufficient green leaf by July, if there are good summer showers, to manure five to six acres from one acre of the crop. Six to seven-week old seedlings also can be planted along field bunds just a week before paddy harvest. These will establish themselves and come up well with the summer showers.

For double crop wet lands, raise thin nurseries by sowing $\frac{1}{4}$ lb. in one cent of land, and plant the seedlings two to four inches apart in the puddle along the bunds at the time of planting paddy. By four months the plants will grow up to 10 ft. and give four to six cartloads of green matter per acre. This can be puddled immediately, or if there is sufficient gap between the first and second crops, the plants can be cut, dried (without decomposing) and applied to the second crop. A few plants may be left over for the collection of seeds.

Recent experiences at the Agricultural Research Station, Maruteru and Anakapalle show that sesbania gives a good yield of green matter in a period of 80 days and the crop can be raised in the Deltas even where the duration between the crops is short.



WHEN GOATS GET SICK

Goats are hardy, but they get sick just as other animals do

by

H.K. Lal

GOATS get sick just as any other animals do. They suffer from goat-pox, contagious pleuropneumonia, parasitic and bacterial pneumonia, indigestion and diarrhoea.

Goats are naturally very hardy, but the flock-keeper nevertheless should guard against these diseases and treat them whenever there is a disease attack. A heavy mortality in goats sometimes also occurs due to parasitic infection.

GOAT-POX

Goat-pox is a fairly common disease and can be detected when lesions are seen on the udder of goats in milk, especially in those which have recently kidded. The lesions, in the form of round nodules, are present on the teats and udder, but may spread to the mouth or lips of the suckling kids. The man who milks the goat may also get sores on his fingers. The condition of the udder being painful, the goat offers resistance to milking. The milk yield also generally goes down.

Affected animals should be isolated. The udder must be given hot fomentation at least twice a day and the udder thoroughly dried thereafter. To hasten recovery and to prevent secondary infection, a mild antiseptic ointment such as sulphanilamide ointment should be applied. A dose of epsom salt twice a week is useful.

PLEUROPNEUMONIA

Contagious pleuropneumonia affects goats of all ages and is a serious disease. Animals suffering from it have cough, sneezing and give out a nasal discharge. Other general symptoms such as loss of appetite, etc., are also seen.

Such animals should be isolated and given proper care and nursing. Some organic arsenic preparations have been found to cure the disease. A vaccine is available which can, if used, immunize the animal to the disease. The vaccination, however, should be got done by contacting the nearest Veterinary Officer in the area.

ANTHRAX

Another serious disease that appears suddenly and takes a heavy toll of goats is the disease called anthrax. Since the disease is communicable to human beings also, extra precautions are necessary in dealing with the disease.

The outbreak of the disease usually occurs when goats are on pasture and animals die sometimes within a few minutes of infection. It is observed that the disease follows a hot dry summer when there is a scanty growth of herbage.

Anthrax usually occurs in an acute form and causes unsteady gait, trembling, restlessness, difficult breathing, bloody discharges from the natural body openings and convulsions, followed by death.

In case of an outbreak of the disease, the animals should be got vaccinated with the help of the nearest Veterinary Officer.

FOOT AND MOUTH

Yet another disease that affects goats is the foot and mouth disease. It is characterised by the formation of blisters on the mucous membrane of the tongue, lips, cheeks, palate and other tissues of the mouth and on the skin between and above the cleft of the feet. It is found that the foot lesions are more common than the mouth lesions. At times diarrhoea and pneumonia also occur.

The disease generally appears in the hot months or in the rainy season. Affected goats should be isolated. The lesions in the mouth should be washed with potassium permanganate, while the foot lesions should be dressed with phenyle or copper sulphate lotions. To prevent the disease from spreading, goats must not be moved from place to place whenever there is an outbreak.

TUBERCULOSIS

At one time the goat was supposed to be immune to tuberculosis, but recent investigations show that the disease does occur in goats, especially when they are kept in large numbers and closely herded together. As such it will pay the owner of a large flock to have the animals tested from time to time for the disease.

JOHNE'S DISEASE

Like tuberculosis, Johne's disease is sometimes found attacking goat flocks. The disease is very slow in its course and in the beginning goes unrecognised. When it comes, well-fed animals are found losing flesh and doing badly but no signs of fever, cough or loss of appetite are seen. Later, they suffer from periodical attacks of diarrhoea which increases in severity and frequency until the animals become terribly emaciated and die of starvation. Such cases must be brought to the notice of the Veterinary Officer in your locality for advice.

PNEUMONIA

An ordinary cold in the goat sometimes gives rise to pneumonia. The disease may also be caused by the goats being sent on long journeys by train or on foot when conditions are not favourable.

Animals suffering from pneumonia show a high temperature, loss of appetite, hard breathing and sometimes cough. Such an animal should be shifted to some dry, warm place where plenty of fresh air without draughts is available. Plenty of fresh drinking water should be given to the animals and dry and hard foods avoided. The animal must be carefully nursed and given soft or liquid nourishing food, in small quantities and at frequent intervals.

INTERNAL PARASITES

Most serious losses occur among goats due to internal parasites. Though deaths are not infrequent, economic losses are great when there is an attack from these parasites because of the loss of condition, unthriftiness, anaemia and other adverse effects. In terms of money all this will mean lakhs of rupees per annum.

The important internal parasites found in goats are round worms, tapeworms, flukes and protozoa which infest the internal organs such as the rumen, large and small intestines, liver and lungs.

When goats are infected with worms, a loss in weight, diarrhoea, anaemia, paleness of the mucous membranes of eyes and mouth, development of a pot belly and quite often a soft swelling under the jaw, are very commonly seen.

Before embarking on treatment for the worms, the flock owner must know what the parasite is. A complete control of the parasites can be assured only by a periodic use of suitable drugs.

Various drugs such as phenothyazine, carbon tetrachloride, arecanut, extract of male fern, oil of turpentine and copper sulphate have been found effective in the treatment for these parasites.

Pheno-thyazine is becoming extensively popular because of its effectiveness and cheapness. The dose recommended by the manufacturers is 15 gm. per goat of average size for routine periodic treatment and 25 to 30 gm. for curative treatment.

The following mixture, which is quite cheap and easily prepared, has proved to be a good preventive for sheep at the Government Livestock Farm, Hissar, and can be safely recommended for extensive use to all goat breeders:

Copper sulphate	8 oz.
Powdered mustard	4 oz.
Water	Sufficient to make up three gallons

The solution should be freshly prepared and the ingredients properly dissolved. Two to two and a half ounces should be given once a month according to the size of the goat.

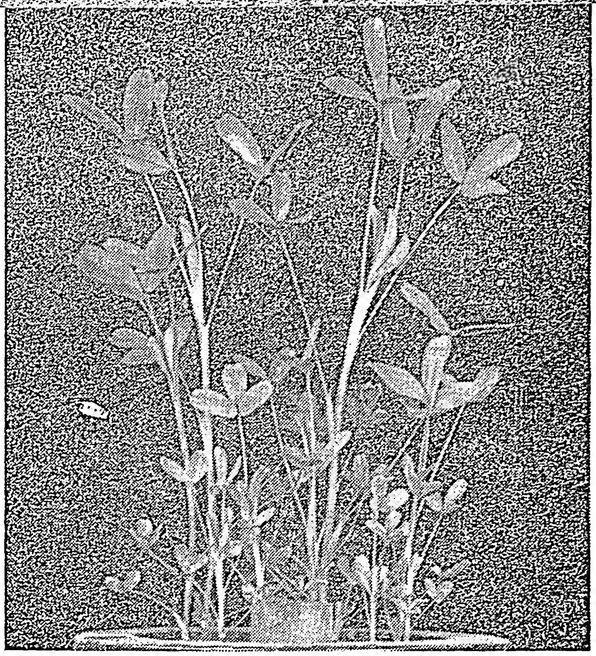
'PITTO' OR 'GILLAR'

Goats often get a disease called *pitto* or *gillar*. The infection occurs due to heavy infection by an immature parasite. The affected animals become dull, weak and anaemic with pallid mucous membranes. In advanced cases, a swelling of the throat is present which appears in the evening and considerably subsides in the morning. Later on, persistent foetid diarrhoea develops. Sometimes there is also a rise in temperature and the animal dies within a period of 10 to 15 days while in other cases there is sudden death, such cases being usually of heavy infection. Treatment with copper sulphate and carbon tetrachloride has given encouraging results but it should be carried out by a veterinarian.

Goats and kids in particular are prone to lice and should be protected against this pest by use of Gammexane which should be used in prescribed strength as dusting powder or as dip.

The mortality among various breeds of goats due to diseases is not so high in adult goats, as it is in kids. The mortality is less in non-milch breeds than in milch breeds, where, again, the incidence is higher among heavy-yielders. In kids, the mortality is more in winter than in the summer. Digestive and respiratory diseases are a common cause of mortality in the kids and uterine diseases in goats, especially in the first kidders. Special precautions are, therefore, required to be taken in rearing kids.

Berseem performs multiple duties



by
B. D. Ganguly and
L. L. Relwani

Experiment brings to light new and interesting facts about an old crop

BERSEEM (*Trifolium alexandrinum*) grown for forage is a popular and ideal winter crop. It is a nutritive green fodder, particularly rich in protein, containing three to four per cent nitrogen (about 20 to 25 per cent protein) on the dry matter. When sown early, it is available in late November when other *rabi* fodders, viz., oats, peas, *methra* and *senji* have not made sufficient growth, and continues up to the end of May when these *rabi* fodders are over and *kharif* fodders such as cowpea, *guar*, *moth*, maize and *jowar* are not yet ready. No surprise, therefore, that berseem occupies a prominent place in the farm economy of the irrigated areas of the Punjab, Delhi, Uttar Pradesh and parts of Bombay. Its ease in culture, luxuriant growth and dependable productivity under variable climatic conditions on a wide range of soils have favoured its recognition as a valuable six-month fodder crop in these parts of India.

Besides supplying regular requirements of rich, palatable and succulent fodder for both work and dairy animals, berseem enriches the soil by fixing considerable quantities of nitrogen from the air. Its vigorous root system improves aeration and the water-holding capacity of the soil and also increases its organic matter status. Berseem adds plant residues to the soil and improves its capacity to release some of the plant nutrients in an available form. The luxuriant vegetative growth of this legume fully covers up the ground, thereby suppressing the weeds. Due to frequent cuttings, it does not harbour insects and smothers the existing ones. Thus, berseem is a nitrogen-fixer, a weed suppressor, a soil conserver, a soil restorative, a medium for reclamation of alkali soils and an excellent nutritious fodder. It also offers the advantages of a green manure crop without its having to be buried. It is, therefore, far more economical to grow berseem in a rotation than raise a green manure crop in an irrigated tract.

METHOD OF CULTIVATION

Berseem grows best on well-drained medium loam calcareous soils rich in phosphates. Acid and damp soils are unsuitable for its growth. Ten to twelve irrigations are generally necessary. The sowing period extends from the third week of September to the end of October. Yield decreases if the sowings are delayed as the growth period is reduced resulting in a less number of cuttings. It is always advantageous to mix berseem seeds with Rhizobia bacterial culture before broadcasting them in the field, as these bacteria

live in the nodules of berseem roots and fix 150 to 200 lb. of nitrogen per acre from the air. Ten to twelve seers is a good seed-rate. Bright yellow and plump seeds should be sown. Immature and brown seeds should be discarded. The seeds should also be free from *chicory* (*Chicorium intybus*), a troublesome weed commonly found in berseem fields.

The crop gives about five to six cuttings and yields 500 to 600 maunds of green fodder per acre. Under favourable soil-climatic conditions, it is capable of giving more than 1,000 maunds of green fodder per acre. The first cutting is usually taken about one and a half months after sowing. Later on, a 30 to 35 days' average interval is the best for effective growth and maximum dry matter formation. Shorter intervals and close cuttings adversely affect the sprouting capacity of the crop. Too long intervals make the fodder fibrous and unpalatable besides causing reduction in ash, protein and phosphorus contents.

Since the berseem has only a few shoots at the time of the first cutting, it is better to grow rape along with berseem. Rape has a quick vegetative growth and the mixture provides a high fodder-yield in the first cutting in the month of November, when there is acute fodder scarcity. With the setting in of spring, the vegetative growth is accelerated for about two months and cuttings can be taken at shorter intervals. Late in the season, the hot and dry May weather affects the succulence and shoot-emergence of the plants, resulting in lower yields.

Berseem is one of those rare forage crops which can be allowed to set seed after yielding fairly good quantities of fodder. For seed-formation, the last cutting should be taken by the end of February or beginning of March and the crop allowed to seed. If the duration between the last cutting and seed maturity is short, immature seeds will be formed. Besides, if the crop is left to seed late in the season, when the hot and dry winds have set in, flower-formation will be affected and also the number of bees responsible for flower pollination will be reduced. This will result in defective seed-setting and lower yields.

The nitrogen nutrition of berseem is chiefly done by Rhizobia living in its root nodules. The plant supplies them with ready-made carbohydrates and they in return fix nitrogen from the air and supply it to the plant. Phosphate when placed in the soil is absorbed by the roots and is also utilized by the bacteria. Hence, the supply of additional phosphate further stimulates nitrogen fixation resulting in a vigorous vegetative growth and a strong root system.

RESPONSE TO FERTILIZERS

Experiments conducted at the Indian Agricultural Research Institute, New Delhi, indicate that berseem responds favourably, both in yield and quality of fodder, to phosphatic fertilizers, particularly ammonium phosphate, superphosphate and basic slag. The residual effects of ammonium phosphate applied to berseem also increased the yields of wheat and maize in the rotation. Besides phosphatic manuring, application of boron at the rate of 5 to 10 lb. or molybdenum in the form of one pound sodium or ammonium molybdate per acre, considerably increased the fodder as well as seed-yields. Probably due to greater yield of berseem roots and greater quantity of nitrogen fixed from the air, the residual effect of these on the succeeding wheat crop was also beneficial.

Experiments carried out on alluvial soils at Karnal indicate that whereas berseem yields improve significantly by the application of superphosphate, increase in the yield due to bone-meal, even at such high level as 120 lb. per acre, is meagre. The yields obtained indicated that bone-meal was practically an ineffective manure in increasing the yields of berseem fodder, because phosphoric acid in bone-meal is mostly in an unavailable form on calcareous soils and is, therefore, not absorbed by the berseem roots.

The effect of superphosphate in which phosphoric acid is in an available form was enormous; the average increase in yield due to application of 80 lb. phosphoric acid per acre was 68.2 per cent on a phosphate-deficient soil. Thus, superphosphate is far more an efficient source of phosphoric acid in stimulating the bacterial action of nitrogen-fixation in the berseem roots than bone-meal.

FERTILITY-BUILDING

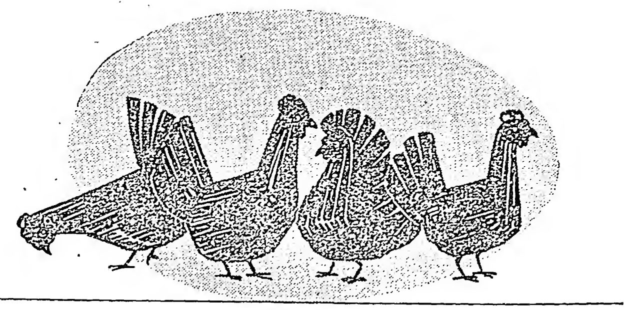
The beneficial role of berseem in building up soil fertility was noticed in an experiment conducted during 1937 to 1939, on manuring of paddy under different rotations, viz., paddy-fallow, paddy-oats and paddy-berseem.

Increases of 52.75 and 40.09 per cent in the yield of paddy were obtained with the application of sulphate of ammonia at the rate of 40 lb. nitrogen in fallow-paddy and oat-paddy rotations, respectively. However, in the third year of the Experiment when berseem was introduced in the *rabi* season, the effects of sulphate of ammonia on subsequent paddy crop were completely masked due to improvements in soil fertility, and the application of extra nitrogen became superfluous.

The same trend of results was confirmed in another experiment for three years from 1947 to 1949 in which paddy dressed with sulphate of ammonia at the rate of 40 lb. nitrogen, recorded increases of 24.7 and 23.5 per cent in the cases of fallow-paddy and wheat-paddy rotations, respectively, but only slight increase of 5.6 per cent in a paddy-berseem rotation.

In two other experiments lasting for six and three years, respectively, an ample proof was obtained that it is futile to apply sulphate of ammonia to paddy in a paddy-berseem rotation. There was so much accumulation of available nitrogen in the soil for the requirements of paddy crop due to fixation of nitrogen by berseem root nodules, that it fully met the demand of the paddy crop equivalent to a dose of 40 lb. nitrogen per acre. When the extra dose of nitrogen was applied to paddy, the yields did not show any increase, rather they were proportionately a little less than the dosage of nitrogen applied.

For Poultry Farmers



ALL ABOUT THE EGG

by

S. G. Iyer

TALKING of eggs, the first thing you talk of is the size. Egg-size varies very considerably not only between different breeds but also between different individuals in the same breed. As a general rule, small birds lay small eggs and big birds big eggs.

The size of the egg laid by a hen depends on a number of factors. Inheritance has a lot to do with the size. The time of hatching is again another factor. As for example, early hatched birds take longer to reach a full egg-size. Climate is another. The size of the egg decreases during the very hot weather, while cold does not seem to have a similar influence. The rate of production also has an influence on the size of the egg. A very good layer takes a longer time to reach the maximum egg-size. It must be noted also that poorly-fed birds cannot give the maximum size of egg because they have to lay at the expense of the body size.

Eggs are small when birds are just coming into production, and increase in size for some months after they have come into it. The maximum egg-size is generally obtained during the pullet year in February or March and the size decreases from March to June and then increases again. When the monsoon breaks in India, the egg-size increases once again. The eggs laid by a bird in her second or third year tend to be bigger than the maximum size obtained in the first year

Since there is a tendency for the size to decrease even in flocks that possess a good egg-size, poultry-keepers must select for this quality continuously in their flocks. Females must be selected for egg-size and mated to males bred for large egg layers.

A hen which lays a long egg will continue to lay such an egg throughout her life. An abnormally long or broad egg does not attract. Such eggs also are liable to damage during transit. The breeder should, therefore, select for lines of normal shape.

The colour of the egg has no relationship with quality, but many customers prefer a dark brown egg. The colour is determined by the breed. A normal Leghorn, for example, lays a white egg while the Rhode Island a brown egg.

It is wrong to prefer birds that lay good coloured eggs from the economic point of view, because a good layer tends to lay a lighter egg than a poor layer. It is possible that the good layer lays a real coloured egg at the beginning, but after an intense lay, the colour may become lighter. It will be wrong to reject such eggs for hatching purposes.

Looking into the inside of an egg, recent research shows that all eggs are not of uniform quality. A first quality egg is one in which the yolk when broken out is upstanding and centrally situated and the white firm and does not spread unduly. It has also been seen that though the keeping quality is governed by atmospheric conditions, certain birds lay eggs which keep better than others.

The poultry-keeper should also be careful about birds which lay an unduly high proportion of eggs of inferior quality and having such defects as meat spots and blood spots. Such birds are likely to transmit this weakness to their progeny. It will be advisable to candle the eggs during the hatching season and set eggs only from birds which do not show any such defects.

The quality of the egg shell is also important. In marketing, weak shell eggs are more liable to be broken. The keeping quality of such eggs is also poor. The quality of the egg shell can materially be improved by a systematic selection for a good shell quality. Poultrymen, as a rule, should never set eggs which appear to have a poor egg shell texture as there is always a danger of the progeny inheriting the factor.

Poor feeding may result in poor egg quality. The egg shell is made entirely of chalk (calcium carbonate). As such it is necessary to feed the birds with sufficient quantity of calcium in a suitable form such as oyster shell or limestone grit. Birds cannot, however, utilise calcium without an ample supply of vitamin D. Excess to plenty of sunshine is one form of supplying vitamin D; shark liver oil is another good source.

Excessively fat birds or those receiving poor exercise also lay eggs with poor texture. As a general rule, birds from a dry climate produce better egg shells than those from a wet locality. Eggs produced in a wet climate, however, have a good keeping quality in the same locality, but do not keep as well if taken over to a drier climate as eggs produced in that climate.

INSECT-KILLERS IN FERTILIZERS

THE use of insecticides in combination with fertilizers is expected to expand remarkably among farmers of the United States.

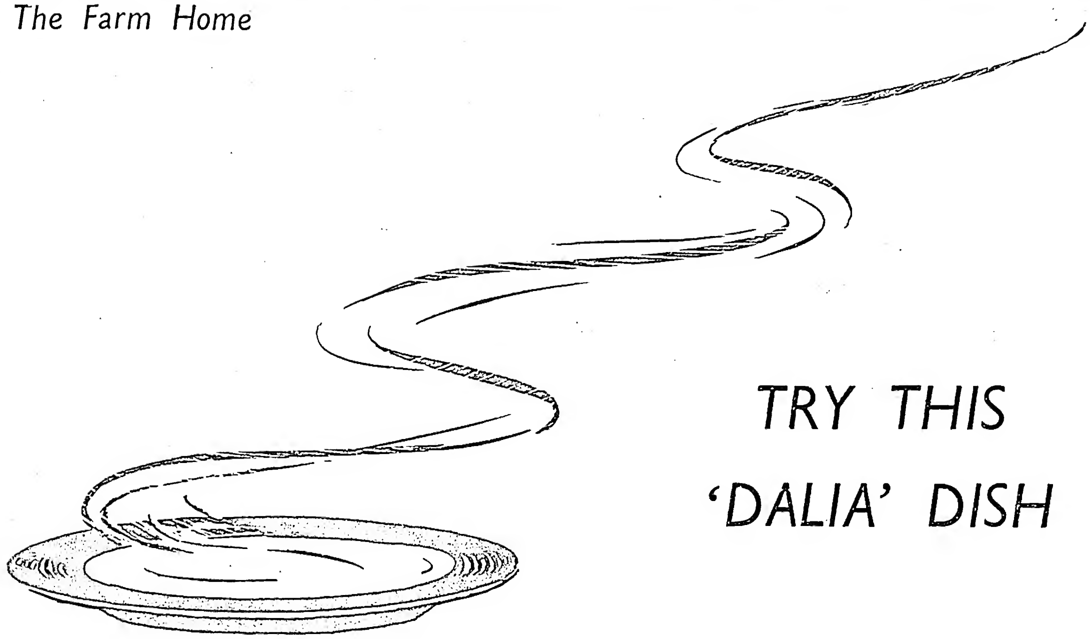
Tests conducted by scientists of the U.S. Government and of state agricultural stations during the last two years have achieved such successful results that a number of manufacturers are now ready to produce insecticide-fertilizer combinations on a large scale.

Last year the mixtures were found effective in controlling northern corn rootworms, wireworms, seed corn beetles, grubs and other soil insects that damage corn (maize). The combined fertilizer and insecticide was applied at the time the corn was planted. The corn thus treated was healthier and more productive than untreated corn.

In the north-central state of Ohio, extensive tests also showed that clover root borers can be controlled by applying a mixture of insecticide and fertilizer at the time red clover is seeded. Hay from the treated fields was considerably better than average, with second cuttings earlier and larger. The clover was expected to hold over to a second cutting year, whereas re-seeding had been necessary before.

Twenty companies are already prepared to furnish farmers in the north-central United States with insecticide-treated fertilizer fitted to particular area needs. The result is expected to be increased corn and hay production with probable benefit to other crops as well.

Aldrin apparently will be the only insecticide formulated with fertilizer for corn this year. The insecticide can be sprayed on the crop fields, as well as applied with the fertilizer. However, farm leaders expect the mixture to be more popular because it makes both applications possible in one process.



TRY THIS 'DALIA' DISH

by

RAMPA PAL

RECENTLY, I prepared a dish of *dalia* of a somewhat solid consistency and cooked vegetables, *dal* and a *chutney* in the South Indian style. The preparation was cream-coloured and softish, looked like *pilau* and tasted delicious. It gave better satisfaction to me than eating cooked rice.

Dalia is prepared by cleaning wheat of its grit and stones and rough-crushing it into small bits. It is used in North India as an invalid diet and for those suffering from teeth trouble. When cooked, *dalia* makes a fairly good meal.

I am mentioning this because many housewives in several parts of India, and especially in the South, found it difficult to take to wheat and *atta* during the time when the rice was rationed and available in small quantities. Some of them, because of the drastic change of diet and ignorance regarding the mode of preparing wheat dishes beyond *upma* or *murku*, suffered a lot because of the badly prepared wheat diet.

Why they did not like wheat preparations was mainly due to lack of elementary knowledge of the right technique of preparing *chapaties*, *purees* and *parathas*. Inexperience in kneading and baking methods results in a hard, lumpy and indigestible stuff which invariably causes stomach upsets, diarrhoea and dysentery.

I think *dalia* may be substituted with advantage in the place of rice and rice gruel. It will prove a popular and pleasant change of diet, especially, for rice-eaters. *Dalia* is nourishing too.

Here is how you prepare *dalia* for your meal:

> Take one cup of *dalia*, three cups of boiling water.

First take the *dalia* and roast it lightly till it gives a sweet aroma—the same way as you treat *suji* before preparing *upma*. Now place it in a *degchi* or wide-mouthed pan and pour the water on to it. Cook it for half an hour on a medium fire, but keep stirring constantly till it thickens or is of the required consistency.

This *dalia* should be a little coarser than the one used for making breakfast porridge.

Will housewives give *dalia* a trial?

READERS WRITE

MAY COVER

Your front page cover for May was a pleasant surprise to me. I like it. —S.S.

COVER PICTURE FOR JULY

On the July 1954 cover are seen two Village Level Workers with a farmer. The picture is very impressive. But could you indicate which part of the country this picture was taken? —R.K.S.

The cover page picture was taken at Sindewahi (Madhya Bharat). The two Village Level Workers seen in the picture are trainees from the Training-cum-Development Project, Sindewahi, talking to a local farmer.

SEED TREATMENT

I was interested about the seed treatment given by the 'Man of the Month' (May 1954) for his jowar. *Please let me know how this treatment is given, because grain smut is commonly seen in our area.* —V.N.K.

In grain smut, the disease germs stick on to the surface of the seed and hence treating seeds with sulphur before sowing gives good results. However, the sulphur used should be of good quality and very finely ground (to pass through sieve with 300 meshes per square inch). The dose followed is three chhataks of sulphur for one maund of seed. If good quality sulphur is not available, Agrosan GN can be used. Agrosan is very effective and the dose is two chhataks per maund of seed. As the seed-treating chemicals are likely to corrode ordinary metallic vessels, some earthenware utensil like an ordinary pitcher can be used for mixing the chemical with the seed. Seed should be thoroughly mixed by shaking it well, taking care, however, to see that the person treating the seed does not inhale the fumes or dust.

If a large quantity of seed is to be treated, it is better to use a seed-treating drum which is available in the market these days at a cost of about Rs. 60. Such a drum can treat one maund of seed at a time or about 40 maunds of seed in a day.

MIXED CROPS

P.C. Raheja's article "Mixed Cover Crops for the Monsoon" reproduced in your May 1954 issue, says that in northern India arhar *is the principal companion crop to* jowar, *yielding an average of about 12 maunds per acre. I would like to know whether this average yield of 12 maunds is from an acre of gross area under the mixture or is the adjusted yield per acre of the net area under* arhar. Arhar *occupies a minor proportion of the total area under the* jowar-arhar *mixture, and if the above figure refers to the gross acre, the yield per net acre will be quite high.* —R.G.

The *arhar* crop is grown singly or mixed with other crops, one of them being *jowar*. Mixed with *jowar*, it is grown in Madras, Bombay, Madhya Pradesh, Uttar Pradesh, Bihar, Bengal, Madhya Bharat, Hyderabad and Mysore. Mixed with *jowar*, it has the proportion of 1 : 2 and 3 : 10. Some cultivators grow it in rows, one row of *arhar* after two rows of *jowar*. Normally, both the crops occupy medium to heavy lands. Quite often, *jowar* is taken off as fodder and *arhar* as a grain crop. It is under these conditions that *arhar*, the principal companion crop to *jowar*, gives yields of the order of 12 maunds per acre. Such a high yield is obtained mostly on deep soils which contain less of clay and more of silt. I am informed that at the Anand Agricultural College in Gujarat they get a yield of 12 maunds when *arhar* is sown along with *jowar* in the same field in rows four feet apart. The yield of 12 maunds can be taken as net yield per acre of the mixed crop under good soil and rainfall conditions. The adjusted yield would be in the neighbourhood of 20 maunds gross yield per acre.—P.C.R.

THE EDITOR INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING," INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI

Indian Farming

VOL. IV NOVEMBER 1954 No. 8

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

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THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

Editor's Page

WHAT THEY NEED IS CONFIDENCE

AN Extension worker was relating an interesting experience the other day. He had introduced a new type of *ragi* (*nachni*) in a rather out of the way village. The variety stood even the adverse conditions well in the field of the farmer to whom the seed was given for trial. Since this field was near the one road of the village, every farmer there had seen the crop and admired it. When the crop was ripe, the Extension worker held a rally of the farmers of the village and the crop was threshed and the grain measured in their presence. The yield was almost double that of the local variety. There was no doubt that every one present was impressed by the performance of the new variety grown. The Extension worker took the opportunity to explain to the farmers the important characteristics of the new variety and offered to supply the seed of the same to them which he had in stock with him for trying on their own fields. To his surprise, none wanted the seed from him, but they all said that they would obtain the seed from the very farmer who had ventured to try it and in whose field they had seen it grow and yield heavily.

The story has a moral. It is not that the farmers in this case did not know that the seed that the Extension worker had was the same as that was grown on the field of the farmer of the village. But it was a matter of 'seeing is believing' with them. Once one of them had grown the new variety and found it successful, the rest had the confidence in it and thereafter would even stake anything for it. What is true of this village is true of thousands of other villages. The lesson that the Extension worker learnt that day was valuable. It was that villagers had the greatest confidence in their own leader who would not do anything, they believe, that would go against their interest.

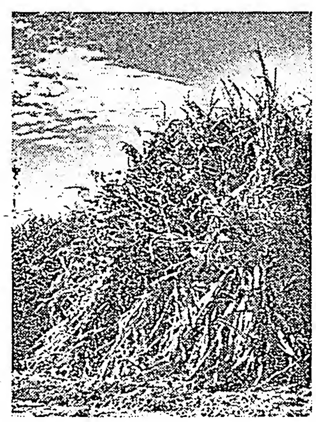
Whenever a new improvement is suggested in any village, villagers hesitate to adopt it unless one among them in whom they have confidence tries it and finds it successful. It is but natural that one cannot expect villagers, whose land returns are not large enough, to risk a new improvement. The improvement has to be tested by a person who can afford to bear the losses in case the experiment turns out to be a failure.

In other words, there must be some assurance for the lay farmer that the new thing that he is introducing in his farm will not end up in material loss to him.

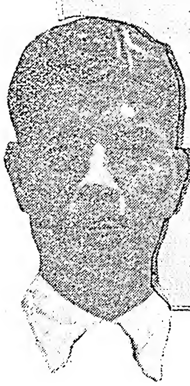
Such a trend of villagers' reactions seems to have been taken into full consideration by the Bombay Department of Agriculture when it established what are called agricultural demonstration centres on the cultivators' own farms in each taluka. The Department introduces all improvements in those farms with a guarantee that if as a result of the introduction of these improvements there were to be any losses, the Government would make up such losses. This has given the required confidence to the farmers to take up these improvements without any reservation, and though the Scheme has been working for the last 10 years or more, it is reported that there has not been even one occasion for the Government to pay compensation to any of the farmers owning these demonstration centres.

It is when such a confidence is created in the farmers, that they and their neighbours see the futility of sticking on to the traditional methods and will voluntarily come forward for more and better improvements.

OUR COVER



How does this harvested maize compare with yours? Farmers all over the country are coming to realize that the secret of successful farming lies in proper cultivation, good manuring and use of good, improved seed. Ask your Extension Officer what seed he can recommend you—so that you too can raise as good a crop as this one



HARD WORK BUILDS A FARM

'SUCCESS comes with hard work' is the motto which has made Shri Sadanand N. Wandrekar, a successful farmer, these 30 years or more. Years ago, he told me, he was interested in sugarcane; not raising just sugarcane, but raising the best sugarcane. In those days, when sugarcane research was still in its infancy, and no manurial or cultural schedules were available as they are today, he raised 103 tons per acre with POJ 2878. That was in 1935. His interest next shifted to coconut. Coconut was considered not fit for growing on a plantation scale in the Thana area of Bombay, but when Wandrekar wanted it he was bent upon growing it. He grew not just one plant, but ten acres of it and successfully too, which made many a sceptic raise his eyebrows. All his labours, however, were lost in a violent cyclone some years later.

Then his interest shifted to building up a farm from waste land. Friends warned him that he will be sinking his money, but hard work saw to it that the waste land bloomed into a first rate fruit-cum-general farm. *Mosambies* and mangoes reign supreme in the 40-acre orchard that Wandrekar has raised on what was thorn and weed.

"Next to hard work," said Mr. Wandrekar, "I would recommend to farmers quality plants, good cultivation, good manuring and plant protection." Explaining what good cultivation meant, he said: two ploughings, one working with a cultivator and a number of weedings and

(*Contd. on page 6*)

Two of the farmer's buffalo-calves born out of artificial insemination

Top : *Sardar Gur Inder Singh, the farmer who showed that a big farmer can also be a progressive farmer*
Bottom : *Manager Ram Lal in the paddy crop raised by the Japanese method*

A STRAIGHT HOP from 30 Maunds to 80

by

MALCOLM ORCHARD

IT must be admitted that it is easier to be a progressive farmer if you are a big farmer. At least, a big farmer doesn't have to live up all his returns. He can accumulate something for investment in better equipment and methods. But many of the bigger farmers are failing to invest in better ways and, in turn, to serve as examples for their neighbours. Too many able men are continuing to influence people to use poor ways by using the same old ways themselves.

The other day we found a refreshing exception to this in Karnal district. We were visiting Mr. Subba Rao of the Karnal Sugarcane Research Station who promised to take us to this exceptional and influential farmer.

We got into the jeep and drove north to Shamghar about four miles away from Karnal city. When we entered the village which sits on a modest hill about two furlongs from the road, Mr. Subba Rao asked for 'Sardarji'. It seemed rather odd that in a Punjab village one could find anybody by asking for him by that general title, but we were immediately given the

proper directions. We soon found ourselves entering the gateway of an old fortress built from the small brick of the Moghul period. Inside we were greeted by Shri Ram Lal Khurana who, we learned later, is the farm manager. Over in one corner of the huge compound we saw a large man directing the construction of a brick building. This we were told was 'Sardarji', or more properly, Sardar Gur Inder Singh.

Shri Ram Lal called him over and we all sat on the large cool verandah overlooking the compound area and facing the front wall of the old fort. Sardarji ordered cold lime squashes and we started asking questions about his farming. He made it clear to us that while he maintained a close watch on all farming operations, he trusted the details to his good farm manager, Ram Lal Khurana, who is a college graduate in agriculture and has many years of successful experience in practical farming. Ram would give us all the details, the Sardar said.

FIRST TO TRY NEW IDEAS

This takes us back to our first point: a big farmer should be an example for small farmers. He should try new things first. He should run the risks of new ideas, because he can better afford to lose a little from a small area.

This is what the Sardarji does. He demonstrates the value of new ideas. Sometimes ideas are not good and he loses a little. Sometimes they are good and everybody who is progressive enough to follow profits by the demonstration.

Last year, when Extension workers came to him about trying the Japanese Method of paddy-growing, he called his farm manager and they decided to try the method on three acres. On these three acres they would follow all the recommendations publicized by I.C.A.R.'s Campaign Committee. So they told the Extension workers that the paddy would be planted and they could bring neighbouring farmers so they could see how it was done in detail. Ram Lal had the land ploughed 12 times. He applied 15 cartloads of manure to each acre. For the nursery, he used eight seers of seed instead of his usual 12. He also applied one pound of manure mixture (ammonium sulphate and superphosphate) to each 100 square feet of the nursery bed. Again, after 15 days he applied to the

Here are two cane crops worth looking at. The one on the right was grown where paddy by the Japanese method was raised last year, and the one on the left was grown on the best field on the farm. Obviously, the residual effect of the fertilizers applied to rice made the canes more robust on the right

nursery another one-half pound of ammonium sulphate to each 100 square feet of bed. He planted *Jhona 349* seed.

Then he waited and watched. At first there didn't seem to be much difference in the nursery beds. Then about the time he gave the first weeding he could see quite some difference. The last week the seedlings seemed to jump out of the ground. The seedlings were large at 28 days-old when he pulled them for transplanting. Ordinarily, it took him 40 days to get seedlings ready.

Thus the first part of the new method was showing up very well.. But what would finally happen ? This land was accustomed to producing 30 maunds per acre. Could he push his production much higher than that and make money ?

He was going to try. So to the field he applied a mixture of five maunds of ammonium sulphate and five maunds of superphosphate in two doses. The first dose came before planting. The second, three weeks after planting. Weeding was done three weeks after planting and again a month after planting.

Again it was watch and wait. But there was very little time for questioning the outcome. The better start the early seedlings—the bigger seedlings—had made a difference from the very beginning. The only question left was: just how much more is this improved method going to yield.

The results were more than good. Eighty-four maunds compared to the usual 30. This was 80 maunds of dry paddy. And the turn-out of rice was 77 per cent compared to the usual 65.

In order that there be no question about these yields the agricultural officers and Extension teachers were invited out to the fields to witness the outcome. But even before this, these Government workers were conducting tours for villagers out to see the amazing demonstration of increased production. An increase brought about by very simple, yet scientifically proven methods that any farmer can adopt.

We were told all of this sitting on the verandah sipping lime squash. But as the farm manager pointed out, this is no way to know a farming operation, and all arm-chair farmers should see the real thing. We took his suggestion.

After going about four miles in muddy roads we came to his paddy fields. This year, he told us, he had placed 15 acres of paddy under the Japanese system. He had a total of 80 acres in paddy. We saw the fields and there was a great difference in growth. The ordinary fields were about knee-high. The better fields were chest-high. And both were planted July 15.

Why didn't he plant all his land under the improved method ? In answer to that he said that some of the land was low-lying and difficult to handle. It might be a risk to apply so much fertilizer to this kind of land. On his other paddy acreages he is following a modified version of the Japanese method. This includes line-sowing, but not quite so accurate, and fertilizers, but not quite so much. Later, he said, he might plant all his land the improved way.

INTERESTING EXPERIENCE

As we were returning from the paddy fields he took us by his sugarcane. There were two fields side by side, but there was a difference of about three feet in their heights. Why this difference, we asked ? "That", he said, "is an interesting story. All the cane was planted the same day; the ploughing, the fertilizer, the seed were all the same. The only difference: the taller field is planted on the three acres where I had my demonstration of the Japanese method last year."

"What does this mean ?" "This is simple," he answered. "When you get higher yields you improve your land. In fact, you can't do one job and not do the other. They go hand in hand. Fertilizer placed on this land for increasing the yields of paddy has at the same time improved the land for the following crop. It is plain for anybody to see that a much higher yield will come from the cane that followed the fertilized paddy."

Thus, while Ram Lal, the farm manager, demonstrates better ways for farming for Sardar Gur Inder Singh, he improves the Sardar's land, and by the time these demonstrations have covered all his land, the Sardarji will be getting double his yields, and, it is hoped, his neighbours will be following his example. If they are following his example in a high enough number, the food problem in India will cease to exist.

(*Continued from page 3*)

hand-hoeings. Manures used for *mosmabies* and mangoes were: farmyard manure five baskets, bone-meal two pounds, groundnut cake and castor cake five pounds.

The farmer believes in mixed farming. He maintains a small dairy of 20 buffaloes. He was the very first one in the District to try artificial insemination for his cattle. "It gets me excellent calves and no bother of maintaining a bull," he said.

None can miss seeing the hard work Wandrekar has put in in his 'Wandrekar Bagh' near Poona City.

M.G.K.

weed your rice with these weeders

The three single row rice weeders with row-widths (from left to right) of four inches in the first two, six inches in the second two and seven and a half inches in the last two

by
R. V. Ramiah

FARMERS have been showing plenty of interest in the new Japanese type rice land weeders ever since they were first tried in Pusa, Bihar (*Indian Farming*, October 1952).

State Governments in Uttar Pradesh, the Punjab, West Bengal and Bihar, the Central Rice Research Institute, Cuttack and the Jute Research Institute, Calcutta, have also been trying the working models of single row weeders supplied by the Indian Agricultural Research Institute, New Delhi, to study their suitability to the various areas.

The Central Rice Research Institute, Cuttack, which planned out scientific experiments to see whether this kind of weeders had any advantage over the present method of weeding rice lands had this to say:

'Interculturing with the rotary hoe is beneficial to the crop and increases yield. Last year, the crop weeded by the local method gave a yield of 3,016 lb. per acre while that intercultured three times with the weeder gave 3,129 lb.

'However, if the weeder has to be successfully worked, it needs to be modified to suit our conditions. Both single and double weeders get stuck in the mud and it is difficult to work smoothly without a forward pull.

'It is seen that the turn-out is about half an acre per day of eight hours and two people are needed to work it. It is desirable that it is so adjusted as to allow only one man to work it. The implement is quite light and there should be no difficulty for one single person to operate it as they do in Japan, but we find the implement nooses down and gets stuck in the mud. Possibly, an adjustment in the handle of the angle will prevent the implement from noosing down. The cost of the implement should also preferably be less than the present cost of Rs. 20 each.'

The Indian Agricultural Research Institute has so far sold out working drawings of the single row weeders to nine firms in India and to two State Governments and one to the Agricultural Officer

(Continued on page 30)

Growing crops grow better when phosphatic fertilizers are first treated and then applied

'COMPOST' your phosphatic fertilizers

by

C. N. ACHARYA

NOT many of our farmers use phosphatic fertilizers to the same extent as they do nitrogenous fertilizers.

One reason for this is the smaller response crops show to phosphates as compared with nitrogen. This is partly because plants absorb phosphates in lesser quantities than they absorb nitrogen. Again, because most soils lack in organic matter and nitrogen, greater stress is laid on nitrogen as a limiting factor in crop production.

But there are areas, like the red soil regions as in eastern Madhya Pradesh or south Bihar and the lateritic zones as on the West Coast, where the quantity of available phosphorus in the soil is much too small to meet the demands of crops. In such soils a combination of nitrogenous and phosphatic fertilizers gives a much higher yield than when nitrogen is applied alone.

The quantity of available phosphorus in most soils is sufficient to meet the needs of a small-sized crop, yielding, say, 1,200 lb. of paddy or 800 lb. of wheat or 20 tons of cane per acre, but when a higher level of production is desired, the supply of available phosphates becomes much too small and it is necessary to give an extra quantity in the form of fertilizers.

When phosphates are added to the soil they easily get converted into insoluble and unavailable forms because of the action of soil minerals, and as such the full effect of the fertilizer added is not felt. Nitrogenous fertilizers, on the other hand, remain in a soluble form in the soil and are available to crops to an extent of 50 to 80 per cent. In the case of phosphatic fertilizers, the crop is usually able to utilize about 10 to 12 per cent only of the quantity added, the rest being converted into a form not readily available to the plants. This difficulty is more serious in certain types of soils.

There are many types of phosphatic fertilizers available in the market, the more important of them being raw bone-meal (unsteamed), steamed bone-meal, rock phosphate, single superphosphate, ammoniated superphosphate, ammonium phosphate, triple superphosphate, basic slag, bird guano, meat-meal and fish-meal.

The most naturally occurring phosphatic fertilizers such as rock phosphate, bone deposits and guano have but a slow effect on plant growth because of the insoluble form of phosphates they contain. Though attempts are made to make the phosphates contained in such fertilizers more soluble by treatment with acid and conversion into superphosphates, the phosphates revert to the insoluble form in the soil.

PLACEMENT OF FERTILIZER

Attempts are being made to get over this difficulty by recommending the 'placement' method of application wherein the phosphatic fertilizer such as the superphosphate is applied in lines and at suitable depths so as to be near the root zone of the growing crop. This method, no doubt, helps increase the quantity of phosphate absorbed by the crop, but it is applicable mainly for line-sown crops, and especially so where the lines are wide-spaced as in cotton or corn. It becomes less useful for broadcasted crops like small grains or the fodders and transplanted crops like rice.

The 'placement' method also causes an excessive concentration of the one nutrient, the phosphate, in the root zone of the plant, which is detrimental to the absorption of other essential plant foods in the soil.

Experiments at the Indian Agricultural Research Institute, New Delhi, show that the process of reversion or fixation of superphosphate in the soil, can, to a certain extent, be reduced by mixing the superphosphate with 20 to 50 times its weight of compost or farmyard manure before applying it to the field. This way, the absorption of phosphate and crop growth have been noticed to increase a great deal.

Best results, however, are obtained by composting the superphosphate with actively fermenting organic refuse.

THE COMPOSTING METHOD

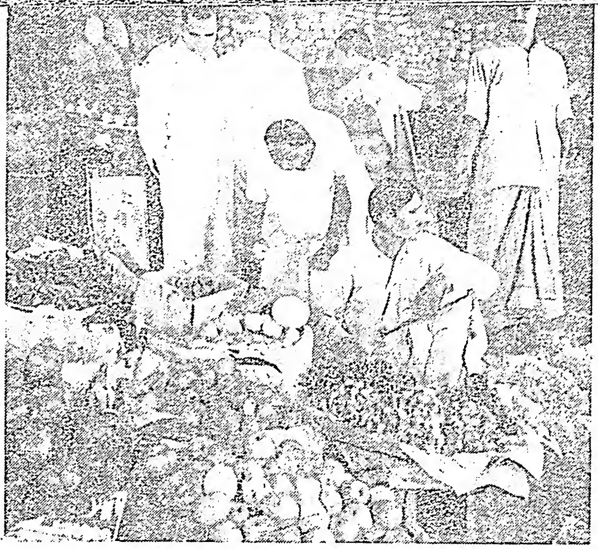
This is done by spreading the superphosphate powder in thin layers, say, $\frac{1}{4}$th-inch thick, over alternate layers of, say, six inches, of mixed cattle-shed refuse or other compost material. The heap or trench so filled up is allowed to ferment for four to six months after which the manure is well-mixed and applied to the field. The fermentation becomes quicker when the mixed refuse contains a sufficient amount of available nitrogen in the form of cattle urine or nitrogenous fertilizers.

Crop trials at the Institute show that when such composted superphosphate is applied to crops, the growing crop takes up a greater quantity of phosphorus and yields higher than when phosphate is applied with an equal quantity of cattle-shed compost, without fermenting the two together. Moreover, laboratory experiments show that the composted superphosphate is protected, to a great extent, from being fixed or converted into insoluble forms by soil minerals.

Composting also is helpful in increasing the solubility of insoluble phosphates such as rock phosphate and bone-meal. Before composting, however, these must be ground to a fine powder, to pass through, say, a 100-mesh sieve. The method of composting is the same as for superphosphate. It is found that after four to six months of fermentation, 50 to 70 per cent of the insoluble phosphate is converted into more soluble forms which could be absorbed by the plants. Experiments show that as with composted superphosphate, composting rock phosphate or bone-meal also gives a higher yield of crops when applied along with nitrogenous fertilizers.

The practice of composting superphosphate, rock phosphate or bone-meal before application as manure is worth adopting when phosphatic manures are to be applied either for making up phosphatic deficiency of the soil or for increasing crop-yields.

LET THE AGMARK SEAL BUY AND SELL FOR YOU



You do not know what you are bargaining for when there is no grading by Agmark

LET the Agmark seal buy and sell for you. For, then you will not be confronted with problems such as what to buy, where to buy and how much to pay, as usually happens when you come across produce of different size and quality in the market and graded by the seller according to his own conception.

When you buy Agmarked produce, you can be sure that it satisfies the various standards of quality laid down by the Directorate of Marketing and Inspection, Government of India.

Grading is helpful to the buyer as much as it is to the seller. While the former when going in for Agmarked produce has the satisfaction of getting what he has actually paid for, the latter is able to obtain a reasonable price for his produce, resulting in a better turnover for him.

The Directorate has laid down quality standards for various kinds of produce including fruits, rice, jaggery (*gur*), cotton, etc. These standards have been evolved on the basis of certain well-defined physical characteristics and differences in quality.

FRUITS

In fruits, the factors taken into consideration in fixing Agmark grades vary from fruit to fruit. For example, in mangoes, the factors considered are: weight, freshness and firmness, size and shape, colour and appearance, freedom from blemishes, damage and malformation and keeping quality; in *mosambies* and oranges: size (diameter), shape and form, stage of maturity, colour and its uniformity, freshness and firmness, nature of skin, freedom from defects due to disease and mechanical injury and keeping quality; in apples and pears: size (diameter) and shape typical to the variety, stage of maturity, colour and its extent of shade and uniformity, freshness, firmness, form and keeping quality, freedom from damage due to disease and mechanical injury; and in pineapples: weight, stage and state of ripening, colour, shape, form, firmness and condition of development, length of the crown and freedom from blemishes and defects due to disease and mechanical injury.

Fruits for which grade specifications have so far been laid down and which are actually being graded are: mangoes—*Alphonso* (Bombay) and *Bathua* (Bihar), *mosambies* and oranges (Bombay, Madhya Pradesh, Andhra and West Bengal), apples and pears (Kulu and Himachal Pradesh), *chikoos* (Bombay), pineapples (Travancore-Cochin) and vegetables—potatoes (Nilgiri Hills).

RICE

The principal factors that determine the commercial grades of rice are the test weight for a given number of grains, the flavour specific to the variety, damaged kernels, freedom from foreign matter and other grains or other classes of the same grain and, also, size of the grain. Freedom from musty and obnoxious odour is also taken into account.

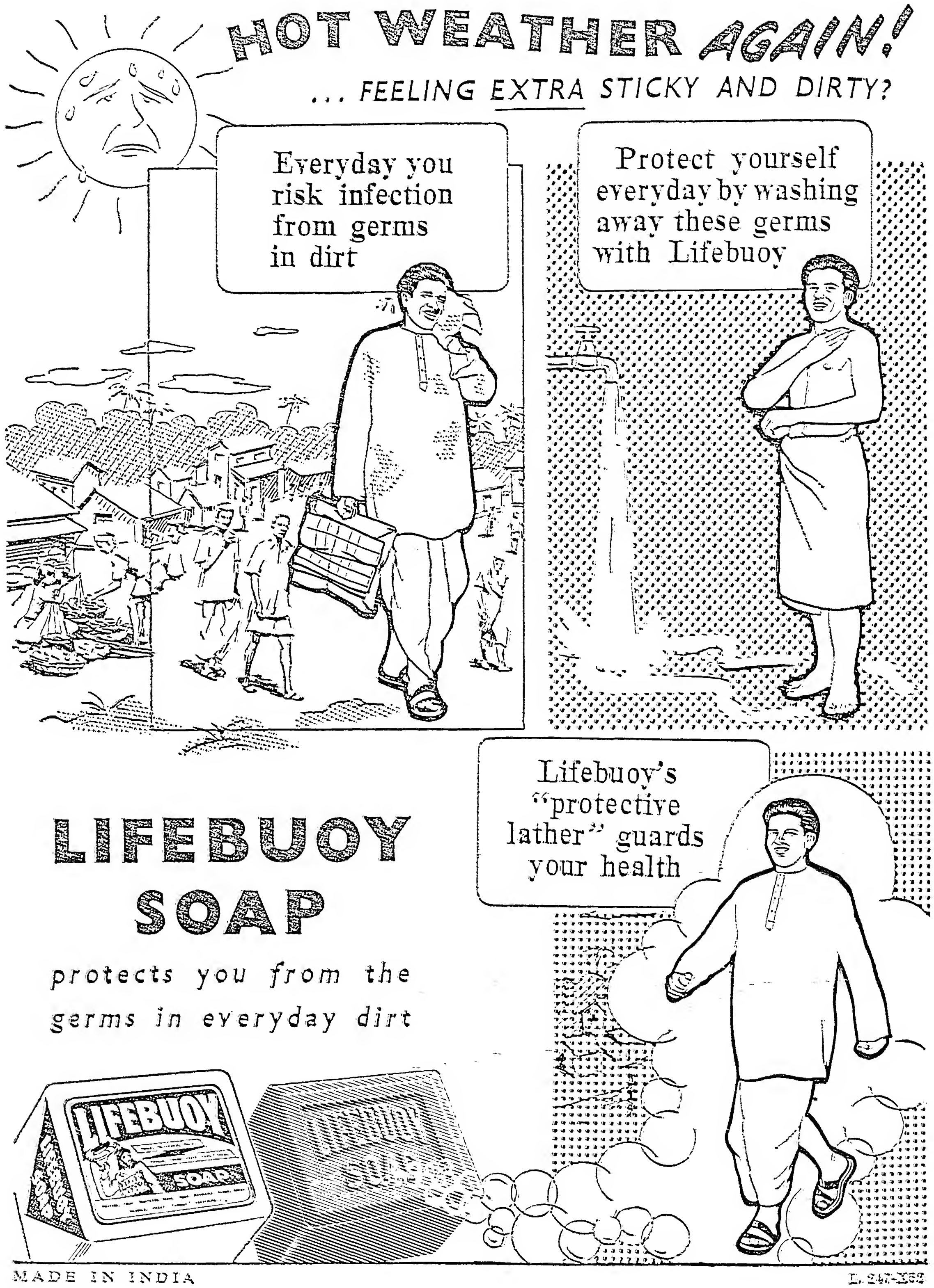
The sum total of the presence or absence of the quality factors indicated above goes to determine the grade of rice. The grade specifications for a number of varieties of rice grown in the country have been drawn up and large quantities were being graded under Agmark until control on rice movement came in as a result of World War II. Grading of rice has once again been revived since last year and at present is in progress in the States of Madras and Uttar Pradesh.

CANE JAGGERY (*GUR*)

The factors that go to assess the quality of *gur* are: colour, texture, form and consistency, refraction of bagasse, dirt and other impurities, moisture content, freedom from sour taste and mould, taste and flavour.

The grading of *gur* under Agmark standards is at present done in Bihar and Madras States.

(*Continued on page 30*)



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PROCESSED COWDUNG AS POULTRY FEED

by

S. Bose

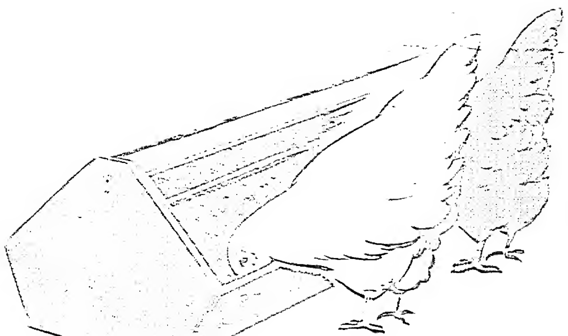
INTERESTING results have been achieved in the research carried out at the Indian Veterinary Research Institute, Izatnagar, on economic methods of feeding poultry.

One such result is the value of cowdung as a rich source of protein feed for poultry.

Poultry feed is the largest single expense in the production of poultry meat and eggs, and unless the cost is reduced, poultry-keeping will not give a substantial margin of profit to the owner.

So far as egg-production is concerned, experiments showed that plant protein supplements like soyabean meal and groundnut cake meal were of little value. Animal products like skim milk, fish meal and meat offal contain a better assortment of essential body-building substances (amino-acids) than plant products. But the poor results with plant protein supplements may not entirely be due to the quality of the proteins contained in them, but to the absence of enough amounts of minerals and vitamins in the diet. When plant proteins in the diet have been properly balanced with minerals and vitamins, good growth and egg-production have been obtained.

Because of the high cost of animal protein supplements, investigations were made whether plant proteins from waste materials like cowdung could be utilized for feeding poultry. Cowdung contains both male and female sex hormones, besides growth-promoting factors. The investigations were to see what effect these hormones and growth-promoting factors had on egg-production and hatchability.



SEX HORMONES

When a normal poultry ration got an addition of eight per cent air-dried cow manure, it stimulated growth and comb-development in both male and female chickens. Comb stimulation in table birds is desirable because of the better appearance it gives to the live birds at the time of sale. The feeding of air-dried cow manure, however, was unfavourable to laying birds. The inclusion of eight per cent air-dried cow manure to the laying ration given to hens reduced their egg-production by 10 per cent. Even when the cow manure was dried at 80°C for 24 hours and given in a groundnut cake supplement and at eight per cent level in the laying ration, the egg-production was nine per cent less than those fed with the ration containing groundnut supplement only.

This effect was due to the male sex hormones contained in the dung the potency of which obviously could not be destroyed even by heat treatment. This was confirmed when the heat-treated cowdung was fed to growing chickens at the eight per cent level. The chickens showed better stimulation in comb-development than those which got the control ration.

WATER EXTRACTION

Further investigations proceeded and it was found that the growth-promoting factors in the cowdung could be removed by extracting it with water, leaving a residue which when added to a laying ration gave a significant increase in egg-production.

The processing of the cowdung is carried out by stirring the air-dried manure with 10 times its weight of water for half an hour, filtering it through a linen cloth and finally washing the residue with water.

An extensive experiment was carried out to study in detail the effect of including the water-extracted residue and the water extract separately in the ration for growing chickens. The feeding experiment was continued throughout the laying period.

It was seen that the inclusion of filter (the water extract) from the cow manure increased the rate of growth of chickens by about 20 per cent in eight weeks and 15 per cent in 20 weeks as compared with the ration containing the water-extracted residue. The feeding of the water extract showed considerable stimulation in the development of the combs and wattles of the chickens.

The laying trial experiment showed that birds when fed with a mash containing the water-extracted residue of the cow manure at an eight per cent level increased production of eggs as compared with the ration containing the water extract from the manure. The average percentage of egg-production in the groups fed with the residue and extract from cow manure was 47·8 and 41·3, respectively.

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Jowar too Responds to Japanese Method

Like rice, *jowar* too responds to intensive cultivation, as this experiment showed

by

S.K. MISRA

THE *jowar* crop responds well to manurial and cultural treatments, but how well does it respond if the treatments are on the same level as prescribed for paddy under the Japanese system? This was the subject of an interesting experiment conducted in the Nagpur Farm in Madhya Pradesh during 1953-54.

With the intensive manurial and cultural methods followed in the experiment, it was seen that *jowar* could be made to yield three to four times the normal, even under rain-fed conditions. To Madhya Pradesh, like Bombay, Hyderabad and Madras, *jowar* is an important staple crop. In the State, annually about 48 lakh acres are put under the crop, which, on an average, yields 652 lb. of grain per acre.

As under the Japanese system for paddy, the factors paid attention to in the raising of the *jowar* crop for the experiment were the selection of a high-yielding variety for sowing, application of heavy doses of fertilizer mixture, sowing of seed with proper and uniform spacing and cultural operations at the right time.

Under the black cotton soil conditions of Madhya Pradesh, *jowar* requires an adequate quantity of nitrogen for proper growth, and phosphoric acid for the formation of a strong root system and formation of ear and grain. The root system requires to be strong in view of the tendency to lodge under conditions generally prevalent in November.

However, when these two are applied at sowing time or as topdressing, it is seen that they adversely affect the germination of seed and also encourage excessive vegetative growth without any appreciable effect on the formation of grain. Hence, a new method of fertilizer application was tried at the Nagpur Farm to get over these ill effects. The method was such as to avoid harmful effects of fertilizers which generally happens when heavy doses of fertilizers are applied to rain-fed *jowar*, and rainfall is unfavourable.

THE METHOD

The land on which the experiment was tried, a medium black type soil, was under wheat the previous season. It was *bakhared* about four inches deep in the summer, and followed by two crosswise *bakharings*.

The soil received both organic and inorganic manures. At the end of May, eight tons of compost were applied to the land and mixed well by *bakharing*. After the monsoon commenced, the land was again *bakhared* to destory all weeds, and 60 lb. of nitrogen and 60 lb. of phosphoric acid were applied as a mixture, in two doses. The two were applied in the form of ammonium sulphate (160 lb.), groundnut cake (350 lb.) and superphosphate (350 lb.),

Half the dose of the mixture was applied deep in the soil towards the end of June in lines through *saratas* attached behind the *argada* having lines 18 inches apart. A week after, the land was *bakhared* but without disturbing the base line.

The new method made the plants look like this

Three weeks after the first dose of fertilizers was applied, the second dose was similarly applied.

The variety selected for sowing was *Saoner*, a high-yielder. The seed was graded and only bold grains selected for sowing. It was treated with Agrosan G.N. The sowing was done in the last week of July by an *argada* in the same lines in which the fertilizer mixture was given.

After sowing, the soil was pressed and the seed covered by working a *pathal* (an inverted long *bakhar*). The seed-rate used was 10 lb. to the acre.

When the crop was about a foot in height, it was thinned out, keeping the plants 9 to 15 inches apart. Four hoeings were given by *guntaka* hoes at 12-day intervals. These hoeings not only helped loosen the soil, but also because of the soil being thrown up against the base of the crop, helped support the young plants. The crop was weeded thrice.

Three weeks before the ears emerged, the crop was earthed up. This operation not only gives a good support to the crop and prevents it from lodging, but also prevents the soil from cracking, thus preserving moisture for a longer time, and checks an excessive vegetative growth of the crop.

Removing the leaves of the plants for a foot or two above the ground, depending upon the height of the plants, is beneficial in many ways. With this treatment given to the crop, it was seen that right from the beginning a vigorous growth was seen in the plants, so that in 60 days the crop reached seven feet in height. The earthing up and removal of lower leaves done after the fourth fortnight helped in reducing the rate of vegetative growth.

Ears begin to emerge in 90 days of sowing and continue up to the 105th day. To prevent lodging of the crop which reduces grain yield, in addition to the earthing up already done, six to eight plants were tied together with leaves to give them additional support.

During September, the crop requires moisture in the soil, and hence requires to be irrigated if rains fail. The rainfall during the month, however, was sufficient this year for the crop, and hence irrigations were not found necessary. However, to test the efficacy of irrigation at this stage, half the area under the crop was irrigated. But it was found that this had no extra benefit, as there was no appreciable increase in the yield in the irrigated crop.

MORE PROFITS

The crop was harvested after about five months of sowing. The yield was 72 md. 32 sr. (5,968 lb.) of *jowar* per acre in the unirrigated area and 76 md. 28 sr. (6,288 lb.) in the unirrigated area. This yield was about ten times the normal yield of *jowar* in Madhya Pradesh. Comparing the cost of cultivation of the new method followed by farmers, it is found that under the new method the total cost came to Rs. 321-11 (unirrigated) and Rs. 349-3 per acre (irrigated) as against Rs. 116-9 by the ordinary method. The gross return worked out to Rs. 1,128 and 1,167 for the unirrigated and irrigated crops respectively, as against Rs.320 by the usual method. The net profit per acre, therefore, worked out to Rs. 806-5 (unirrigated) and Rs. 817-13 as against Rs. 203-7 by the ordinary method.

The Experiment, therefore, indicated that the new method as tried on the farm had great potentialities for increasing *jawar* grain and fodder yields and bringing better profits to the farmers.

The plants were tied this way to prevent them from lodging

Let's Talk Soil Conservation

by

S. P. Teotia

ONE difficulty that faces Extension workers in educating farmers in soil conservation measures is the small size of the average farm unit and fragmented holdings.

To this, the only answer would be getting the farmers to form associations and taking up soil conservation measures on a co-operative basis through them.

This would be necessary for another reason too. A piece of land requiring a particular measure may belong to different farmers in the same village or farmers hailing from different villages. It will be easier to persuade farmers to take to these measures if they could be collectively made to take interest in the work.

Soil conservation is not a mere control over erosion. It includes all those measures and practices which help maintain the productivity of the soil at a high level through scientific methods designed to conserve soil and water. In other words, soil conservation is improved land use.

Publicity and demonstrations which make farmers aware of the magnitude of erosion problem and control measures should go side by side with the conservation programme. Extension teaching can be through the personal service group which includes field visits and Extension schools, the propaganda group which includes bulletins, leaflets, radio broadcasts and general meetings and the object lesson group which includes demonstrations, exhibits and film shows.

By far the best among these would be demonstration. For this, however, the Extension man should first create confidence in farmers so that they may never feel suspicious of what is being put up for them to see.

Better land use can be planned by aiming at a scientific conservation farming which includes both soil and water. The conservation problem has to be tackled both on cultivated and waste land. The work on the former is easier. A general programme for conservation Extension will be consolidation of holdings, introduction of improved methods of farming which safeguard the fertility of the soil and demonstration of such operations as construction of ponds and tanks for irrigation, drainage of irrigated land, contour cultivation, graded channel terraces for the uplands, discouraging the up and down cultivation on slopes, improvement of the uplands by green manuring and applying of fertilizers, better fertilization and irrigation of paddy lands, water management and conservation of gullies.

A SOCIAL PROBLEM

Conservation work on waste lands is more of a social problem than a technical one. Since these lands belong to a community as a whole, these are the worst eroded areas and need protection the most. Such areas make a forest problem. In the Damodar Valley area the waste lands have been sub-divided as follows:

(i) Gullies: some of these are non-reclaimable and are to be tackled as gully area and be protected by gully plugging, check dams, etc. Some of these are reclaimable for paddy cultivation and some for afforestation

(ii) Waste lands reclaimable for paddy cultivation

(iii) Waste lands reclaimable for upland cultivation

(iv) Those reclaimable as pastures

(v) Those reclaimable as forests

Soil conservation measures have to be taken up by the entire community for quick and effective results

Erosion can be worse than this. Action has to be taken before good cultivated land is completely eaten away by erosion and rendered barren as those

Such waste lands as are unfit for reclamation are recommended for bringing under pasture or forest. Such areas need restricted or controlled grazing (possibly enforced through legislation) and protection from excessive felling and fire till a sufficient vegetative cover has come up, after which a rotational or controlled grazing is recommended. The practice of shifting cultivation has also to stop, if soil erosion is to be arrested.

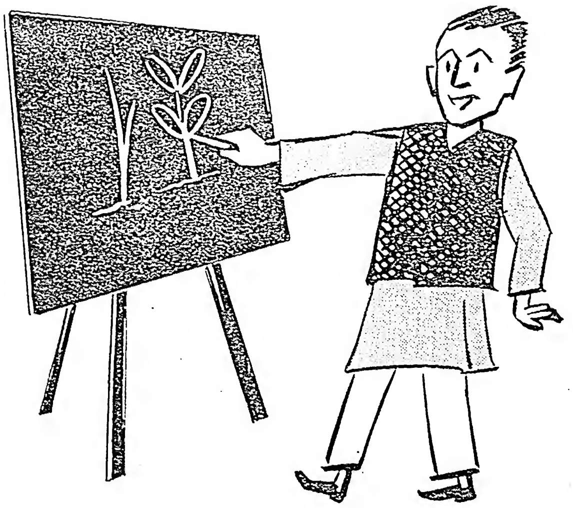
A POINT TO REMEMBER

The Extension service will also have to remember that soils become poor by use. They will, therefore, have to distribute improved seed and organic manures and fertilizers and also demonstrate to farmers and in their own fields the time, method and dose of application of these manures and fertilizers, so that they may build up the soil productivity. As with proper use of cultivated land, the use of forest land also has got to be impressed upon farmers. This means an efficient farm forestry Extension. This Extension will have to aim at the best land use of potential forest lands on farms. Lands which are less fertile, stony or otherwise not suited to agriculture should be devoted to forest. Marginal and abandoned farm lands should also go under forest land use. Farmers will need help in establishing, protecting and managing farm forests. The forestry Extension staff should impress upon farmers how forest farms can be a source of revenue as well as a means of controlling erosion on slopy and unproductive lands. They would also need help in getting the right type of plants for growing.

Soil surveys and soil maps will be a great help to Extension workers to apply results of research to the farms.

Above all, it would be good to remember that this programme can succeed only if farmers can be made to understand the importance of the problem and made willing partners in a work of such great importance.

As in other fields of Extension work, it will be a good rule to do a few things at a time and do those well in soil conservation Extension too.



From Blackboards To Flannelgraphs

DO you know that the blackboard is a simple but effective means of holding the attention of the group in meetings and discussions? By writing on the board as you progress with the discussion, you can also keep their attention on the particular subject you are trying to keep them interested in. A blackboard is also very useful in conducting literacy classes.

You can make a blackboard with a piece of ply-wood 30 by 40 inches. Paint this board with blackboard paint. Chalk and some kind of an eraser is all the other equipment you need.

If the board is to be carried from village to village, it can be made into two pieces and folded in the middle. Have a small strip of wood attached to one side of the fold so that it can be slid across the board after it is opened, and the board made firm.

When you conduct a meeting or a discussion, write the topic for discussion on the board, preferably in the form of a question like this: 'what is the best way to clean the village tank?'

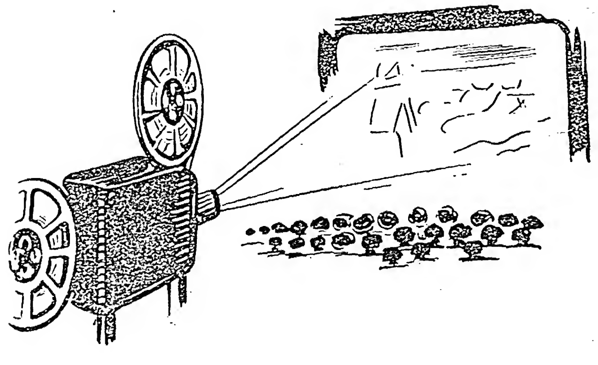
During the discussion, write under the topic the suggestions offered by the group. Also place on the board the suggestions that you have. It is good to put simple drawings on the board to illustrate points.

However, before actually using the blackboard in your meetings, practise how to do it properly. The following rules may be observed.

See that when you start the discussion, the board is properly cleaned. Use a clean eraser for the purpose. You should write in large letters, taking care that you do'nt fill the board too full. Avoid using abbreviations. Don't stand in front of the blackboard, stand to one side. You should not attempt to talk as you write, but face the group after writing and continue the discussion.

If possible, use coloured chalk—yellow chalk will be good at night.

The same blackboard can be used for the flannelgraph— described elsewhere in this article. It can also be used for screen in showing film-strips after covering it with clean white cloth.



MOVING PICTURES

Moving pictures are one of the most effective means of arousing interest. They attract even people who will not attend any other kind of meetings. They are also good for teaching. As long as good moving pictures are scarce, you may use them primarily to persuade people to attend meetings.

Good moving pictures can arouse emotions and change attitudes. They present facts in a real way, bring new practices to a village in a short time and reach illiterate as well as literate people.

In a moving picture we have the following advantages: the whole process can be shown in a short time, without having the worker to speak. People identify themselves with the characters in the picture and, in this way, they feel more closely to the subject.

Take care to select only those moving pictures for exhibition that are simple, direct, interesting and personal, and would lead to action.

As a general rule, you should give a small talk before a picture is shown. In this talk, the purpose of the meeting and of the picture should be explained.

The moving picture should not be used alone; it should be used in connection with a definite programme or a campaign and should be timely. It should be supplemented with literature, posters and demonstrations. What is more important is that after the picture, you should allow the villagers to discuss and to ask questions.

FILMSTRIPS

The use of filmstrips is one of the best ways to teach improved methods. A filmstrip is a series of still picture negatives on one roll. These nega-

tives are arranged together in such a way that they will tell a story or explain the steps of an improved practice. In a filmstrip, an entire process such as growing paddy, for example, can be shown at one short session.

Filmstrips are shown with a filmstrip projector, a machine quite simple to operate. There are filmstrip projectors that do not require electricity. The whole equipment, including the filmstrips, does not require much space and can be carried easily.

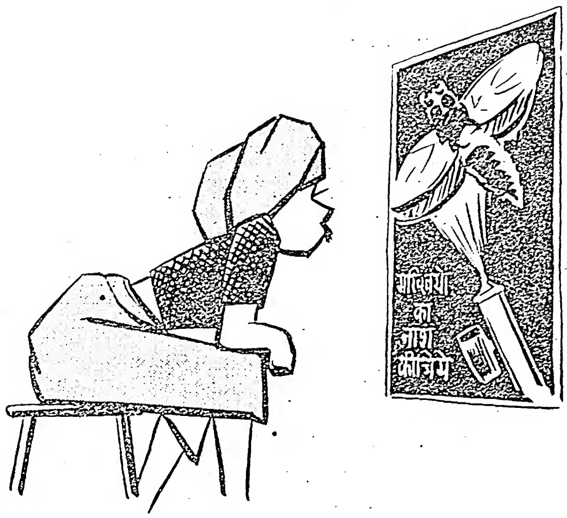
Filmstrips have one distinct advantage: the pictures can be held on the screen for a long time. The villagers can thus also participate through discussions on each picture. Besides, the village worker with a camera can take good pictures of local practices and have them made into a filmstrip at a very little expense.

If you have not been using filmstrips you should contact your superior and ask him to make a projector available, if possible. In the event a projector can be made available, you must then find how filmstrips can be obtained. Some of the sources are: Development Commissioner; Director of Agriculture; Rural Information and Broadcasting Department; Education Department; Health Department; Indian Council of Agricultural Research; and others.

PHOTOGRAPHS

If a village worker can afford to buy any equipment, one of the first things he should buy is a camera. After using a camera, the village worker will discover that he can make interesting pictures. He will also discover that the editors of papers will become interested in his material if he gives them photographs also.

Photographs are especially suited to teaching illiterates. People love photographs and will certainly become attached to the village worker who can produce them. A good way to use photographs is to place them on a village bulletin board. These should be arranged to tell a story or to tell the steps in an improved practice. These should give accurate details, showing the results achieved before and after the adoption of the new practice. Good photographs used in this manner depict people as they really are, and are easily understood; they arouse action and emotion.



But photographs will have little value if they are not clear, dirty or too small, and are in bad taste. Only lively photographs arranged properly with a view to teaching can create the desired interest.

POSTERS

Another important visual aid essentially used as part of a systematic campaign or a teaching programme, is the poster.

A poster arouses mob psychology. It generates a feeling of obligation in responsive individuals. To be effective, posters must be put up at strategic points.

Apart from serving as an inspiration to the villagers by indicating official interest in the problem treated, a poster serves as a constant reminder to the people as long as it remains in the village. To be useful, therefore, a poster must be planned for a special job, such as mobilising public opinion in favour of 'killing flies', 'manuring paddy', 'culling poultry', etc. Posters may also be usefully employed to support local demonstrations or exhibitions.

A poster must be planned to attract attention of the people who are supposed to do the job. It must contain dramatic pictures from everyday life that will stop people and make them look at it. Besides being timely, it should influence people by persuasion and not fear.

A poster should be at least 20 by 30 inches in size and should be made in pleasing colours. It should tell the story in a single glance by having a few and simple words written in bold letters, and should attempt to convey only one idea.

Generally speaking, a poster should contain three main divisions. The first part should usually announce the purpose of the poster, the second set out conditions and the third recommend action. Each of these three main divisions may be suitably illustrated with art work, supported by brief language.

FLASH CARDS

When dealing with small groups of not over 30 people, flash cards are often used. Flash cards are used in the same way as filmstrips except that, in flash cards, the group sees the picture directly instead of seeing it on the screen.

Flash cards are made up of simple line drawings, photographs or cartoons in which plenty of colour has been used. A flash card must be large enough for every one in the group to see—at least 22 by 28 inches or even larger.

The story is told as each card is held before the group. Flash cards are usually used for telling a simple story describing one operation as applicable to local conditions. For example, it would tell villagers how to control mosquitoes or how to have clean water or how to make hay.

Ten or twelve flash cards should be sufficient to illustrate one talk. Most effective flash cards are planned by picking the main ideas from your talk that you want your villagers to remember, and figuring out the picture in each idea which will give a visual impact to the idea. To be successful with flash cards, it is essential that the story on each card is familiar to you. While telling the story, you must use simple words and local expressions, bringing in local names of people and villages.

Have the cards stacked in order. As one card is finished, it is slid behind the other so that it will be in order the next time it is used.

Hold the card in such a way that people can see it clearly. You must hold cards against the body and not up in the air. Turn your body toward the different parts of the group to show the card to all.

Point to important objects without covering the card, glancing down at the card as you tell the story. You can be more effective if you are able to show that you are enjoying doing the job.

As you acquire skill in this method of teaching, you may allow the people to participate in the discussion or in telling the story; this is bound to have better effect. If any one in your group is good at telling the story or leading a discussion, let him take the cards and use them with other groups.

FLANNELGRAPH

The flannelgraph is another device that can be used with advantage for illustrating your talk.

The flannelgraph works on the principle that some materials will stick to each other. Pieces of flannel or felt or sand-paper, for example, will stick on flannel when simply pressed against the background of flannel, and they will stay there until they are removed. Some village workers have also used *khadi* with success for this purpose. They have made *khadi* stick on *khadi* or sand-paper stick on *khadi*.

For instance, if scraps of sand-paper are pasted on the backs of photographs, these photographs will cling to a large piece of flannel. The same is true when sand-paper is stuffed to the back of drawings or lettering drawn on medium-weight paper. Even illustrations from magazines can be used for this purpose.

A flannelgraph is set up by stretching a large piece of flannel tightly and fastening it securely to a stand or blackboard. A 30 by 40 inch piece of flannel will be sufficient for any audience you may have. A good grade of cotton flannel with thick nap is best.

Prepare a flannelgraph story this way.

Serialise a few big and bold drawings, photographs or illustrations to form a simple story. Cut these from their paper back-ground and paste pieces of sand-paper on their backs. Medium or coarse sand-paper strips, an inch or so wide, should be fixed at intervals of several inches.

Before using the flannelgraph, put the title of your story in large letters at the top. It is then advisable to number and arrange each part of the story in the order it is to be added to the board.—*From the forthcoming publication "Extension Guide for the Village Worker."*

WOOL FROM POLWARTH SHEEP

The analytical data presented here relate to the samples of wool from the Polwarth sheep supplied by the Sheep Breeders' Association of Australia. These are juxtaposed with the results of experiments in India for comparison. Analyses of wools of the improved Indian breeds of sheep, indigenous as well as cross-bred, are also reproduced here for the information of sheep breeders

THE Polwarth sheep, the cross of a pure Australian Merino with a pure Lincoln, was first bred by Mr. Richard V. Denis of Australia who worked at Tarud-warncoort. It is considered to be a medium-wooled sheep and its history dates back to 1880. With one exception, it is more or less concerned with three principal original and independently established flocks of Victoria and Tasmania, areas where the finest Australian wools are produced.

Four samples of wool from the Polwarth sheep received from Australia were analysed with the results indicated in Table I.

Von Bergen while describing the general characteristics of cross-bred wool type breeds (American Wool Handbook, 1948, p. 96) reports that the grade of the Polwarth wool ranges from 50s to 64s with a staple length of four to six inches, and a yield of 65 to 70 per cent. Although the results indicated in Table I confirm these characteristics, it appears that the samples analysed were taken from selected animals with finer quality wools.

MERINO AND RAMBOUILLET

In order to compare the wools of the Polwarth and other fine-wooled sheep, information in regard to the Merino and Rambouillet sheep has been collected from various sources and given in Table II.

The qualities and grades of the Merino wools within Australia are given below:

Name of wool	*Quality on shoulder*	*Fibre length (in inches)*
Victorian	70s to 90s	4½
Sydney	64s to 70s	5½
Adelaide	60s to 64s	5½
Queensland	60s to 64s	6
Westral	60s to 70s	6
Tasmanian	70s to 80s	3½

TABLE I

Description of the sample	Fibre thickness in microns: Mean	Fibre thickness in microns: C.V. (per cent)	Approximate count number (quality)	Mean fibre length (in inches)*	Crimp per inch	Yield (per cent)	Length classification
Ewe's fleece	21.14	22.4	60 to 64 s	5.34	12	68	Combing
Ram's fleece	24.66	21.6	60 s	4.96	10	66	Combing
Lamb's fleece	24.48	21.4	60 s	2.00	12	74	Clothing
Wether's fleece	25.73	23.3	58 s	7.30	8	72	Combing

* The period of growth is not indicated

TABLE II

Country	Breed	Grade or quality	Staple length (in inches)	Crimp	Yield (per cent)
Australia	Fine-wooled Merino	74s to 90s	$2\frac{1}{4}$ to 4	—	50 to 60
	Medium-wooled Merino	64s to 70s	3 to 4	—	45 to 55
	Strong-wooled Merino	60s to 64s	3 to 5	—	42 to 50
U.S.A.	Type A Merino }	64s to 80s	$1\frac{1}{2}$ to 2	—	30 to 42
	Type B Merino }				
	Type C Merino	64s to 80s	$2\frac{1}{2}$ to $3\frac{1}{2}$	—	
	Rambouillets	58s to 70s	$1\frac{1}{2}$ to $3\frac{1}{2}$	—	35 to 45
Argentina	Type A Merino	60s to 64s	$1\frac{3}{4}$ to 2	—	35
	Type B Merino		2 to $2\frac{3}{4}$	—	40
	Type C Merino		$2\frac{3}{4}$ to $3\frac{3}{4}$	—	45
France	Rambouillet 1927	64s to 70s	$2\frac{1}{2}$ to $3\frac{1}{2}$	—	—
India	Merino } *	21.64u(64s)	4.88 } †	14	46
	Rambouillet }	23.40u(60s)	4.56 }	12	41

Note: In the case of India, analyses were conducted at the Poona Farm

* Imported † Mean fibre length

TABLE III

Type of sample	Origin	Fibre thickness (in microns) Mean	C.V. (per cent)	Approximate equivalent count	Fibre length (in inches)	Medullation (per cent)	Secured yield (per cent)	Crimp (per inch)	Per-year yields of wool in two clips lb.	oz.
Deccan Merino	Poona Farm	23.44	24.9	60s	3.61	—	46	12	1	14
Patanwadi selected	do.	34.26	38.4	48s	3.03	—	87	—	2	0
Deccani selected	do.	38.24	41.4	44s	2.30	—	85	—	1	10
Bikaner selected	do.	20.44	30.1	64s	3.72	—	71	8	4	14
Bikaner 'A' type	Hissar	26.55	34.2	56s	4.12	3	82	8	4	14
Bikaner lamb 'A' type	Hissar Farm	18.77	30.8	70s	—	—	80	—	4	10
Hissar	do.	24.24	28.9	60s	2.80	—	65	12	4	8

In reference to the areas of its origin, it is evident that the Polwarth breed has been developed from the finest wool-producing Merinos in Australia. A comparison of its wool with that of Merinos and Rambouillets shows that it compares only with lower quality Merinos like 60s to 64s, but compares favourably with the Rambouillets. The fibre thickness variation also falls within the range of the Merino wool (18 to 25 per cent). In some cases, the wool from the Polwarth may be 58s or below which comes in the medium or strong-wooled class. The fibre length and the yield are superior to those of the Merino or Rambouillet, while the crimp and other characteristics are comparable with those of the Merino type.

FINE-WOOLED INDIGENOUS SHEEP

For a comparison with indigenous wool types, analysis results of some local wools are given in Table III.

It is evident that some of the indigenous wool types are as fine as the Polwarth, and are also free from medullation. The fibre thickness variation is however more than 30 per cent, which reduces suitability of the latter for utilisa-

(*Continued on page 30*)

वर्षा का संकेत

SIGNS OF RAINFALL

कलसे पानी गरम हो, चिड़िया न्हावें धूर।
अंडा लै चींटी चलै, तो वरखा भरपूर।।

If water kept in a vessel gets heated, the sparrows come down on the earth and dive in dust and ants move with their eggs, then it must rain heavily.

उत्तर चमकै वीजुली, पूरब वहनो वाउ।
घाघ कहै भड्डर से, वरधा भीतर लाउ।।

If wind blows from the east and lightening occurs frequently in the north, then Ghagh says to Bhaddar, 'Shelter thy cattle, as it will rain'.

जो वदरी मा खमसे,
कहें भड्डरी पानी वरसे।।

If the sky is cloudy and the weather sultry, then Bhaddar says, 'It must rain'.

विरछां चढ़ किरकांट विराजे,
स्याह सपेत लाल रंग साजे,
विजनस पवन सूरिया वाजे,
घड़ी पलक माहें मेह गाजे।।

If the chameleon climbs up the tree and changes its colour red, dark and white, and strong wind blows from the north-west, then there must be a heavy downpour in the next few minutes.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

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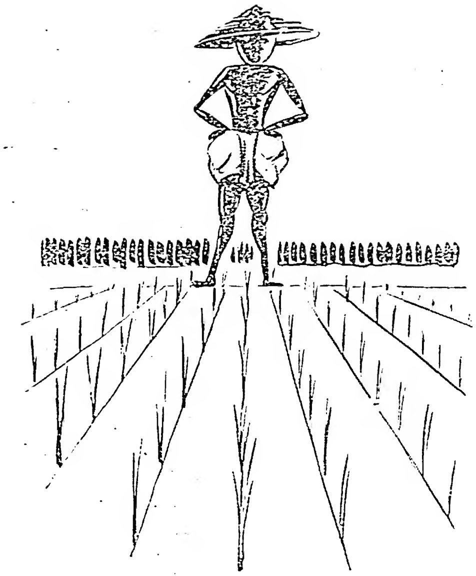
STRONGEST PULLING LONGEST LASTING TYRES ON EARTH

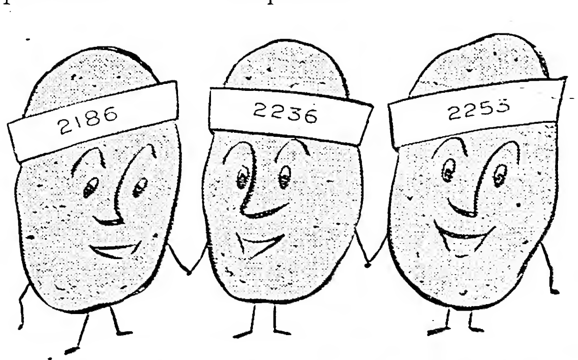
WHAT'S NEW IN FARMING



NEW POTATO VARIETIES

THREE new potato varieties evolved at the Potato Breeding Sub-station at Simla have been found to be superior in performance to the existing early-growing varieties for the North Indian plains. The three varieties are hybrid 2186, hybrid 2236 and hybrid 2253. The plants are erect and compact and when fully grown, present an impressive stand in the field. The varieties mature in two to two and a half months and give an average yield of 150 maunds per acre when planted in early season and about 225 maunds in the main season. They produce attractive tubers of a medium size with a white skin colour. The tubers also possess a good keeping quality.

These varieties are fairly resistant to virus diseases. Hybrid 2186 has also been found to do well in trials conducted at Koilpatti in the plains in South India where potato cultivation is generally not possible due to the prevalence of very short and mild winter conditions. Hybrid 2236 has given a yield of about 350 maunds per acre in some cultivators' fields in Patna.



Small quantities of seed of these varieties are being made available to farmers for trial by the Central Potato Research Institute, Patna.

HEAT IN COWS

EXPERIMENTS conducted at the Government Livestock Farm, Hissar, show that feeding special concentrates increases the frequency of heat (oestrum) in cattle. Among the concentrates tried, mixtures of *bajra* and gram and *methi* seed and gram were found quite efficient in bringing cattle into heat. The mixture of *bajra* and gram gave the best results. This will be of interest to livestock owners who can adopt this feeding method for reducing the long dry period found in some of the animals they maintain.

NEW COTTONS

TWO new varieties of cotton have been responsible for increasing the area under American cottons in the Punjab to about nine times of what it was in 1947.

The two varieties are 216 F and 320 F. The first one is recommended for growing in the south-eastern districts of Hissar, Rohtak, Gurgaon and Karnal. The other variety has proved more useful for growing in Amritsar, Jullundur, Ludhiana and Ferozepur. 320 F is early-maturing, and is resistant to jassids. It is also superior in yield to 216 F.

LINE-SOWING OF JUTE

LINE-SOWING of jute has been found to offer a number of benefits to jute-growers.

The quantity of seed required is reduced if line-sowing is resorted to. Intercultural operations and harvesting become easier. The furrows and ridges formed by interculture make the drainage problem simpler. Line-sowing makes the plants more uniformly spaced, as a result of which they can receive better individual care. A uniform quality and increased yield are other benefits derived.

The method also reduces the cost of cultivation. It has been found that while 60 labourers are required for weeding an acre of jute sown broadcast, only 10 to 12 are found sufficient for an acre sown in lines.

On farmers' fields, wherever line-sowing was tried, yields increased from seven to nine maunds per *bigha* and income shot up from Rs. 183 to 238.

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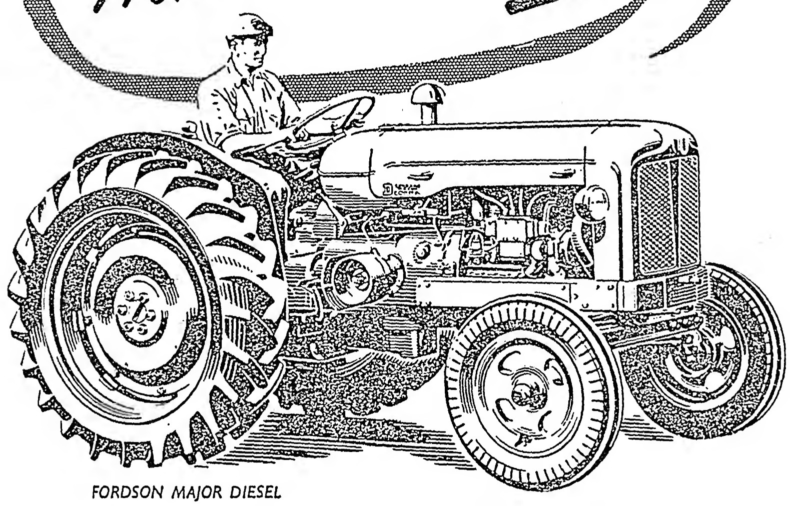

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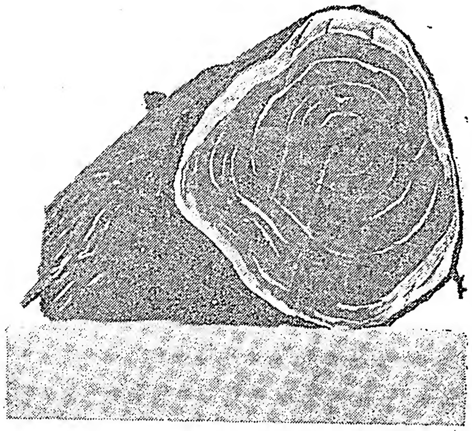


Cross-section of a nearly ten-year old tree

MESQUITE likes the South

by

B.W.D. Ponnaiya, T.B. Krishnaswamy Rao and L. Anavaradham

The popular plant of many purposes reigns supreme where many others generally fail

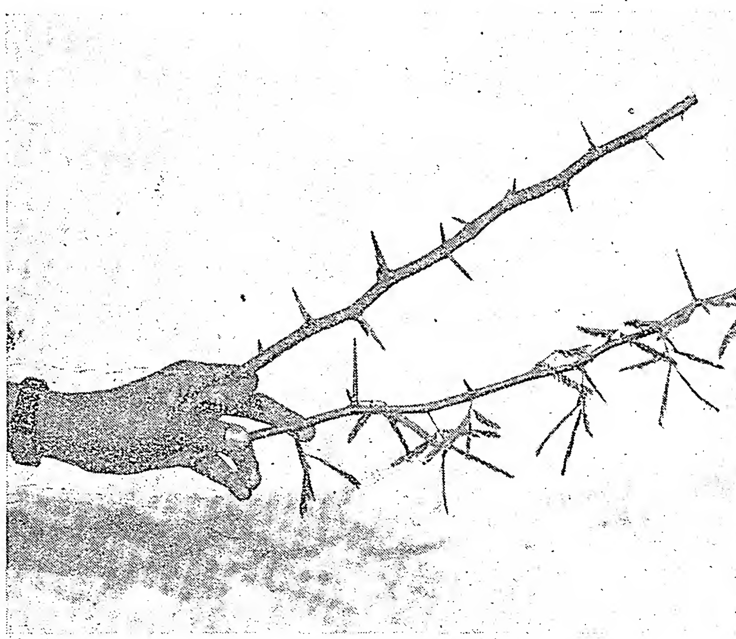
FEW people know that Mesquite was first introduced in India as long back as 1911. Since then this thorny leguminous tree has been spreading fast and is being liked wherever it has been introduced for the very many uses to which it can be put. Mesquite likes the South too. The Madras Department of Agriculture has been one of its staunch supporters because of its utility to farmers as an evergreen protective hedge, a fuel-yielder and one that gives wood good enough for furniture or agricultural implements.

The Department has been taking steps for wider growing of this tree in the barren tracts, tank beds, road-sides and along railway tracks in the State.

Mesquite hails from Brazil but has been widely distributed the world over these 50 years. Its ability to suit even arid regions, its thorny nature and its quick-growing habit have made it a welcome visitor wherever it has gone.

Even in the seedling stage, the plant is sufficiently deep-rooted. Seedlings barely six inches tall have been found to produce tap roots four to five feet in length. This deep-rooted nature and its tiny leaves have made this tree highly drought-resistant.

Mesquite branches showing the powerful thorns



The filling up of the top interspaces has been done by twisting the branches of adjacent trees. The bottom interspace has been filled up by raising seedlings at a later date

Side view of an eight-year old windbreak

Its non-palatability and the stout woody thorns produced by the plant have made it suitable for growing as a valuable live fence. The thorns are formed at the base of each leaf, often in pairs. The length of the thorn is up to two inches. The thorns drop off at the base in two years time, leaving the older stems smooth. Hence fresh branches have to be stimulated every year to keep the fence effective.

Its quick-growing long flexible branches give it a drooping appearance because of which the plants can be trained to form a continuous fence by twisting the young branches of two adjacent plants. As the branches mature, they become woody and it is not possible to disentangle them without cutting them.

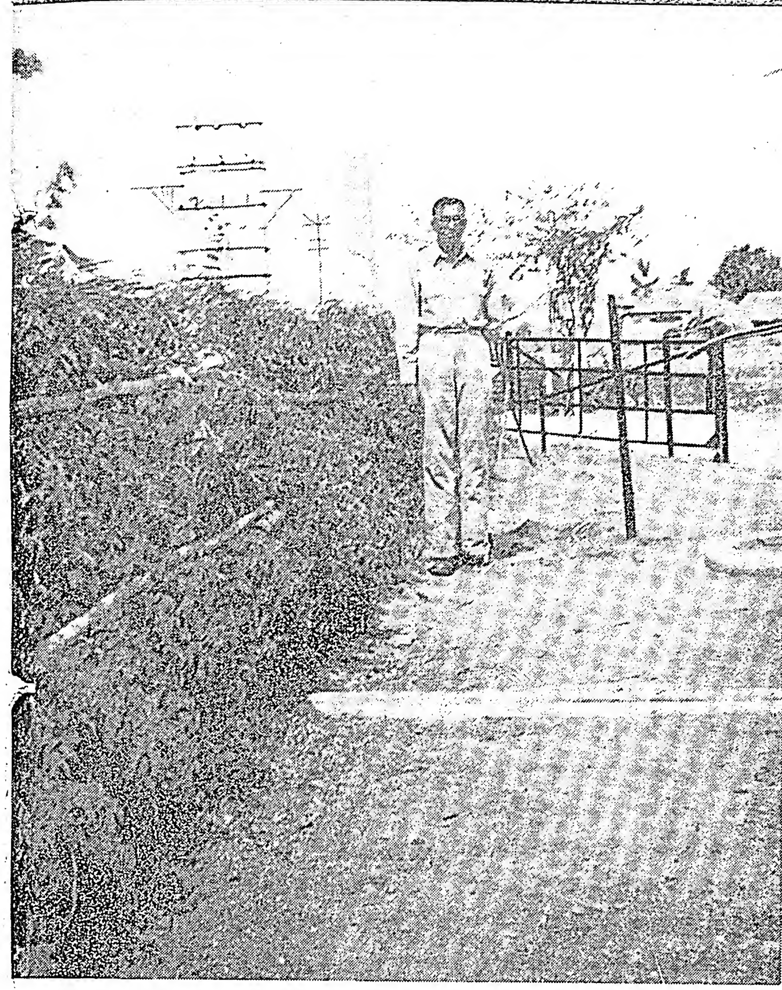
Although the plant is non-palatable, the ripe sugary pods, which drop down on maturity are readily eaten by cattle, goats and sheep. The seeds so eaten and voided along with the droppings of these animals are capable of germination. If these droppings are applied as manure, the field will turn weedy with the seedlings of Mesquite. In Central America, this plant has become a bad weed on cultivators' fields through this agency.

SEED EXTRACTION

The Mesquite seeds are small and hard and an ounce of them would contain nearly 1,010 seeds. The seeds are borne in long pods. The pods turn yellow when ripe and drop to the ground. When pounded, the pods break into bits along the transverse depression, each bit containing a seed. It is very difficult to separate the seed from these broken bits as they are hard and do not yield to mechanical pressure.

An easy method of seed-extraction has been evolved at the Agricultural Research Station, Kovilpatti. The broken bits are steeped overnight in cold water and dried in bright sunshine on the next day. Thus treated, the hard cases enclosing the seed snap open along with the suture when mechanical pressure is applied to them. The dried matter is pounded in a mortar with a wooden pestle with iron tips. For each charge, broken quartz (about 1/10th of an inch in diameter) is added which not only facilitates husking but also improves the germination capacity of the seeds. Tests conducted on the seed so obtained showed 80 per cent germination as against 25 per cent of the hand-extracted seed. The extraction percentage of seed is 10 per cent of the pod weight.

In Hawaii, they say, Mesquite flowers afford a good bee-pasturage and that out of the annual production of 600 tons of honey in that island; about 200 tons are derived from Mesquite alone. Observations made at



(*Above*) *Side view of a one-year old fence*

(*Below*) *A full-grown, almost ten-year old tree*

the Agricultural Research Station, Kovilpatti, show that the plant flowers throughout the year and this is the only bee-pasturage available during the droughty parts of the year.

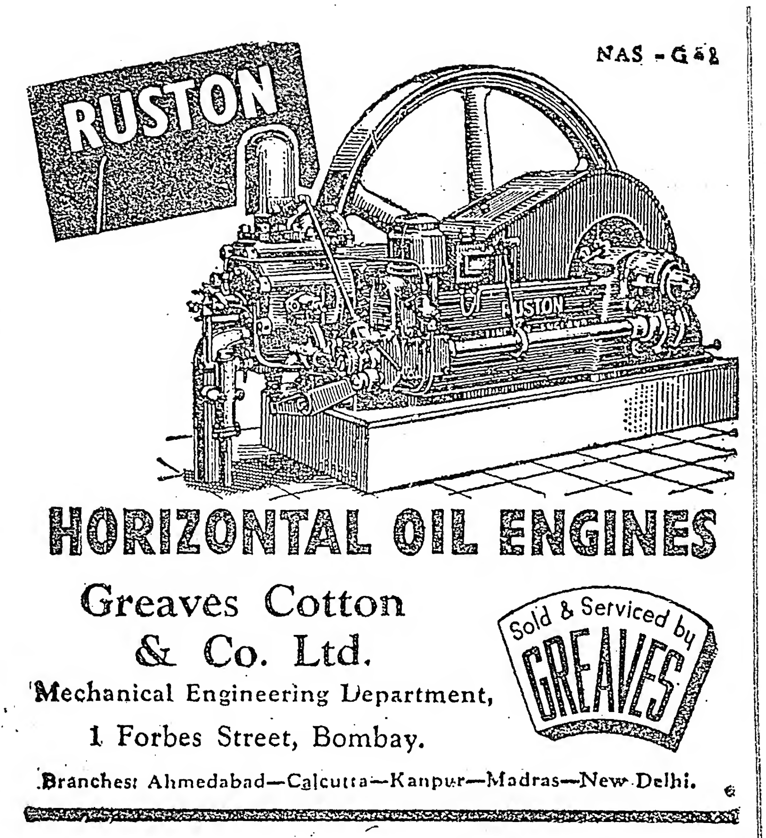
RAISING MESQUITE

For raising a hedge or a windbreak it has been found necessary to dig a trench one foot by one foot and fill it up with prepared soil. The seeds are dibbled during the soaking rains of the monsoon. Better germination is obtained when seeds are soaked in cold water for four hours prior to sowing. Since the plants are drought-resistant, there is no necessity to irrigate them. In case a quick growth is desired, the plants may be irrigated.

Seeds are sown in a single line one inch apart. One ounce of seed is sufficient to sow a length of thirty yards. When the seedlings are about three weeks old, they are thinned out to a spacing of three to four inches. The second and final thinning (spacing six to eight inches) is done when the plants are one foot tall. At this stage, the top shoot is pruned which stimulates four to five basal branches. The tops of branches can be trimmed again when they are three feet high. It is preferable to close up the branches which grow away from the fence with bamboos. Thereafter, the plants may be pruned to the desired height of six feet, preferably at the commencement of the rainy season. This pruning stimulates a large number of new branches which can be twisted with those from the adjacent plants to form an impenetrable fence.

For securing a windbreak the final spacing between plants should be nearly two feet. This allows the stems to grow in girth. In this case also, the two top prunings should be done when the plants are one foot and three feet high. Instead of arresting the growth at the sixth feet, the plants should be allowed to grow and pruned when they are 12 feet tall. The twigs of the adjacent plants are twisted with each other in the tender stage. The branches which come away from the sides are to be pruned periodically to stimulate fresh basal growth, and these can be trained as they come up.

The plant can be grown to big trees. In ten years' time the tree reaches a girth of nearly one foot and a height of 40 feet. The wood can be used as fuel and also as timber. It gives a strong wood of pinkish colour useful for manufacturing local agricultural implements. It can also be used for making furniture as it is capable of taking a good polish.



(*Continued from page 11*)

COTTON

Specifications framed for cotton take into account its purity and factors like moisture and presence of leaf, seed stains and other impurities. For the present, grading of cotton is confined to the certified pedigreed varieties in Bombay State.

However, merely the drawing up of grade specifications does not end the matter. It is necessary that all those engaged in the marketing of agricultural produce cooperate in popularising and making the system a success all over the country.

(*Continued from page 13*)

Poultry-keepers, therefore, can utilize both the fractions of processed cow manure for their growing and laying stock. The water extract which contains the growth-promoting factors and the male sex hormones can with profit be included in the ration for growing chickens so that they may have better growth, better feathering and better development of combs and wattles. The water-extracted residue which probably contains female sex hormone factor can conveniently be included in the laying ration at eight per cent level for increasing egg-production and also for effecting a saving in the cost of poultry feed.

(*Continued from page 7*)

in British Solomon Islands. The single row rice land weeders are being sold by Indian firms at a cost ranging from Rs. 15 to 20 each. The Rice Experiment Station at Karjat in Bombay has also designed a cheaper model.

The original Japanese model of the single row rice land weeder had a width of $5\frac{5}{8}$ inches and it could work in a transplanted field where the row-width was more than eight inches.

The number of rice plants per acre and the row widths of transplanted paddy differ from state to state, but it should not be necessary to have an implement for each pattern of planting. Hence we have fabricated single row weeders with three different widths of four inches, six inches and $7\frac{1}{2}$ inches. The handle bars are of the single rod pattern or built of two rods. All salient features in the original design have been retained in the new ones. In all the three types, the angle of pushing and the depth to which the weeder should penetrate can be adjusted.

(*Continued from page 22*)

tion as a good clothing wool. Even such qualities of wool are very few in India, a majority being the coarse carpet types. There is also greater variation in the fibre length of the finest indigenous wools as compared with the Merino, making them less suitable for worsted manufacture. Some of the other physical characters like softness, pliability, strength, colour, etc., are also lacking in the indigenous wools as compared with the Polwarth wool sample.

Looking for a complete food?

The egg dishes you would like

IF you are looking for a food complete in itself, then you better think of eggs, because you cannot think of any other food that is cheap, easily available and easy to digest. The egg is a good food for young and old. For growing children there is none better.

The egg is a food *par excellence.* Most of the vitamins and minerals lacking ordinarily in our diet are found concentrated in it. The egg contains protein of a very high value needed for body growth and repair of tissues. The egg is also a good source of vitamins A and D as well as some of the B vitamins. The presence of these vitamins helps you to keep off respiratory infections like common cold and bronchitis and eye symptoms like night blindness, build up a strong nervous system and a good digestion, assure good teeth and bones, and help prevent deformities in children.

The egg-yolk is a rich source of vitamin D, which is so essential for children. Children should be given eggs at least four or five times a week.

The egg has many of the essential minerals required for good nutrition. It is rich in calcium, phosphorus, iron and sulphur. Calcium and phosphorus build strong bones. Iron prevents anaemia. Sulphur is needed for the hair and nails.

CARE IN COOKING

Nutrition experts are never tired of singing the praises of the egg. To get the best out of an egg, however, the housewife should pay sufficient care in cooking it. The first principle she must remember in cooking eggs is to cook them on a moderate fire whether she is cooking them in water, frying-pan or oven. Eggs cooked with a high heat have, like all foods rich in proteins, a tendency to become stiff and leathery.

Eggs should never be over-cooked. In boiling eggs, cover them fully with cold water and then gradually heat the water to the boiling point but never plunge them into boiling water at the beginning itself. To get soft-boiled eggs, boil them only for three to four minutes and to get hard-boiled eggs for seven minutes.

For frying, break the eggs into a saucer and slip them into a frying-pan containing *ghee* or vegetable oil. Cook over a moderately hot fire until the whites are set.

Scrambled eggs are prepared by beating two eggs with two tablespoons of milk and seasoning with salt and pepper. This is poured into a frying-pan containing *ghee* and continuously stirred over a low fire until it thickens. When served hot you will love its flavour.

The taste of scrambled eggs can be improved by adding cooked tomatoes. For every three or four eggs, one cup of cooked tomatoes will be required. Similarly, scrambled eggs with bread crumbs, previously browned with a little *ghee*, or chopped onions or green pepper can be prepared for getting better flavour.

Another way of serving eggs is by preparing omelettes, either plain or with vegetables.

STORING EGGS

Here are a few tips for the huosewife for storing eggs. Eggs are stored best when the shells are cleaned. Before storing, all soiled spots on the shells should be wiped with a damp cloth. But eggs should not be washed till just before using them because the washing removes the protective film on the shell which closes all the pores of the egg and helps in keeping out bacteria and bad odours. Eggs should be stored in a covered vessel or bowl, away from strong smelling foods. Without a cover, eggs are bound to lose moisture faster and are more liable to absorb outside odours. Eggs should always be stored in a cool place.

FARM FLASHES

On an average, about one lakh cattle worth more than two crores of rupees die in the Indian Union due to rinderpest alone

Paddy yields can be increased by 32 to 140 per cent with the application of nitrogenous manures; the response obtained on irrigated wheat is of the order of 10 tons of grain for one ton of nitrogen applied

There are about 500 million acres of arable land in India out of which 60 million acres are irrigated and receive an assured and regular water supply

Only one millionth of a millionth of an ounce of (plant) hormone is required to cause a growth of half an inch in plants

By inducing anaerobic fermentation of cowdung, gas containing methane and hydrogen can be produced for use as an illuminant in mantle lamps

India is the largest single sugar-producing country of the world, possessing 30 per cent of the total world cane-acreage

Compared with potato, sweet potato is richer in carbohydrates, calcium and vitamin A

Only about one-half of the water delivered at the head of a canal actually reaches the field, the rest being wasted in the manner: 17 per cent in the main lines and branches; 17 per cent in distributaries; 25 per cent in cultivators' water courses

Warble flies *Hypoderma lineatum* and *H. Crossii* cause a value-depreciation of the order of a little less than two crores of rupees in the hides and skins produced in India every year

Indian Farming

VOL. IV DECEMBER 1954 No. 9

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

ISSUED BY

THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

TWENTY-FIVE YEARS

THIS month, the Indian Council of Agricultural Research will be celebrating the completion of 25 years of research in the field of agriculture and animal husbandry. The Council was established in 1929 to undertake, aid, promote and co-ordinate agricultural and animal husbandry education, research and its application in practice, development and marketing by such means as would increase scientific knowledge of the subject and secure its adoption in everyday practice, and to disseminate information on improved practices to farmers. During the 25 years, the Council's programme of work has been of an ever expanding nature, embracing all important aspects of crop and animal husbandry. It has to its credit results of research which when applied in practice are capable of bringing better harvests to millions of farmers all over the sub-continent. Wherever these results have been put into practice, farm yields have increased anywhere from 20 to 100 per cent or more. Similar benefits have also accrued to farmers as a result of the Council's livestock research schemes, touching all aspects of breeding, feeding, management and disease control. The initiation of the key village schemes is another of its long chain of achievements. Research work in poultry farming, dairying, fisheries and bee-keeping has now made it possible for farmers to have a valuable subsidiary industry alongside farming. The Council's schemes in the field of Extension also have borne fruitful results. Not the least in importance of schemes is the one designed to bridge the gap between the laboratory and the field by periodically conveying to the farmer, in the language that he understands such results of research as can be gainfully applied to farming and stock management. *Indian Farming* has been striving to put before farmers the results of scientific investigation in a simple and informative manner, so that they may harness science to agricultural industry for their benefit. It is a heartening sign that more and more farmers are realising the benefits of research and adopting such measures as have been proved beneficial by scientific investigation. The country's progress can be measured only when there is a substantial follow up in the field after the laboratory has shown the way things can be done best.

OUR COVER

When the grain is ripening the farmer's vigilance increases. Bird-scaring is an interesting job for the children especially when there are a number of them together at it. The boy in the picture told our photographer with obvious pride, "the birds are so scared of me that I need'nt use a stone for the sling. I just use the sling and it serves the purpose." The sling was just a piece of rope

THE GRAND OLD MAN OF SARGONDI

"LET me introduce to you Sardar Basant Singh, the grand old man of Sargondi," said Agricultural Inspector Pal Singh, when I visited Sargondi, a small village in tehsil Phillaur of Jullundur district in the Punjab, a few months back. I really admired the man when I came to know more about him.

A successful farmer himself, and a popular figure of his area, Sardar Basant Singh is famous for having infused a spirit of progressiveness among fellow-farmers through his steadfast devotion to the ideal of rural uplift. He has spent a major part of his 70 years in goading them to action for achieving the goals of better farming, better yields and better living.

In 1921, when he set about the arduous task of consolidation of holdings as a first step towards agricultural improvement with the help of the State Department of Agriculture, he realized that there was no short cut to the realization of his dreams. But he fully banked upon his inexhaustible store of patience, and advanced with confidence. He is now proud of his achievements which are by no means meagre.

When everybody was reluctant to deviate from traditional farming for getting benefits that seemed 'doubtful', and some even scoffed at the idea of "fiddling with our main sustenance", he took to the cultivation of improved varieties of crops such as wheat, cotton and sugarcane himself, and wiped away the misapprehensions of his fellow-farmers by obtaining bumper yields. He was also successful in introducing improved agricultural practices such as line-planting of sugarcane, line-sowing of cotton, cultivation of paddy by the Japanese method, a liberal use of fertilizers, manufacture of *gur* with improved furnaces, etc. The farmers around him also picked up from him the use of improved agricultural implements, namely, furrow-turning ploughs, kisan hoe, bar harrow, cotton drill, etc.

His was the first village in the area to get electricity, and he immediately installed a tube-well and a power-crusher for sugarcane in his farm; and through his efforts, Sargondi can now boast of as many as 22 power-operated pumping-sets.

One such worker a village, and the condition of lakhs of villages dotting the country would be transformed into one of happiness and prosperity.—**H.K.S.**

Man of the Month

Dev Prasad Singh

MAKES HIS SMILE WORK FOR

by

S.P. Ambasta

THE Indian village is such. Probably, it was meant to be such, so that the community that lives in it may be very well-knit. What I mean is, the village dweller, be he a labourer, a farmer or anybody else, cannot live for himself. He has to lend a helping hand to his neighbour and to the community, if village life has to be happy and prosperous.

This was forcibly brought home to me when I met Dev Prasad Singh the other day. He farms on a 40-acre land in Sipara village in Patna district in Bihar. " You say improve your agriculture," he told me, " But I would say improve your agriculture as well as your village."

I was curious. I talked to Dev Prasad Singh. I had prepared myself to meet and talk to a good farmer, but now I was talking to a village leader as well.

Dev Prasad Singh is 50 and he has seen floods visiting his village a few times. He recounted to me how a decade ago the river close to his village had come into spate with some unusually heavy rains. Water had begun to overflow the banks. The village seemed to be at the mercy of the overflowing water. Dev Prasad Singh knew that if the river was not checked by means of a bund quickly, the village would be lost.

" But the question was how to erect a bund in such a short time ", he said, " we had no money. But we had the desire to erect a bund. The desire had to be translated into action and everybody was waiting for somebody to come forward and organize a working party. I went out to my community and requested the members with my folded hands that they all join me and put up the bund. I had pinned all my hopes on this appeal. The folded hands brought the needed response. All men of the village worked day and night and we made it. It took us just four days and the bund saved the village, its 125 houses, 3,000 head of cattle and acres of rice."

Dev Prasad Singh's experience is rich. He thinks that the desire for co-operation is there in every villager's heart but it is dormant. It has to be roused, and so far as Dev Prasad Singh is concerned, he does it with a smile and folded hands. That energises the laziest man into action.

Dev Prasad Singh narrated to me other occasions when he had to go out to his community, and every time how he had succeeded in getting them work on some project or the other for the welfare of the village.

The village suffered from poor sanitation. Til six months ago there was no drainage in the village The dirt and filth were scattered all over the place This time too Dev Singh took the lead. He got th

village folk to meet and decide that they all work a day in the week. Now, the village looks cleaner and is healthier.

Similarly, the villagers have constructed a school and a library. The village boasts of a *Nav Yubak Sangh*, akin to Farm Youth Club. " Next winter we are going to fix up a tube-well for *rabi* irrigation," said Dev Singh, " and all these things so far done or being done are without any Government help. We have done it ourselves and we want to do everything ourselves."

A BUND IN 48 HOURS

As we talked, we came over to a freshly prepared bund. I was told that it was finished just two hours before I had reached this village. The village had enough of rain in the early weeks of August. According to the practice here, rain water has to be stored in a ditch for irrigating paddy in September-October when the chances of rain are rather slim. But the ditch had no bund to check the overflow of the accumulated water.

Dev Singh was worried as he anticipated the overflow to damage the rice fields. More than that, there would be no water for irrigation in October. This leader then had approached the village people and explained to them his fears. Again, his smile and folded hands became an irresistible appeal to them. In 48 hours they had completed the 50-feet bund.

With a twinkle in his eyes Dev Singh said, " Now our rice and *makai* crops are safe. We are sure to have a good harvest."

LIKES JAPANESE METHOD

So much for Dev Singh's leadership. Next we

Dev Singh beside his paddy field. He is confident that next year all the rice-crop in the village will be raised by the Japanese method

BUILDING A BETTER COMMUNITY

Sipara men preparing to leave for home after they had completed the big bund after a stretch-work of 48 hours

visited his farm situated in the heart of the village. Surely, Dev Singh has had a good inheritance from his forefathers—not so much the land as the experience. Here I saw that not a patch of land was idle. A few acres had maize grown for fodder. The rest of it was all rice. The farmer had seen the Japanese method of growing paddy in village Gopalpur close to his own, last year. That made him stay in that village for a few days so that he may learn the technique of the new method.

Shrewd as he was, he came back and replanted rice in one of his plots to test.

"The result was quite exciting. I got a yield of 19 maunds of grain per *bigha* by the Japanese method as against 12 maunds by the local method," said Dev Singh. This year he got the boys of the Patna Extension Training Centre for demonstrating to the villagers the new method. "Most of us", he said, "have adopted this method now and by next year, I am sure, the local method would have certainly disappeared completely from this village."

There was one interesting aspect of rice-growing that Dev Singh explained to me. Here, in the village rice is sown broadcast. But the Japanese method advocates line-sowing. Dev Singh considers that this is the one great principle in the Japanese method. "This principle can also be adopted in the direct sowing that we do here. We are now sowing in lines and that has cut on our seed and we are raising very healthy and robust plants."

This visit to Dev Singh was a rich experience to me and when I left, I left with the conviction that a humble smile and folded hands were far more powerful than any other method of approaching the villager I could think of.

Let them have comfort, warmth and protection, and watch them perform better

Housing Your Poultry

by

S. G. Iyer

THE village poultry-keeper pays rather poor attention to the housing of poultry. He generally puts them in mud chambers or packing cases during night time. Such houses give a certain amount of protection from their natural enemies. Others shut their birds in baskets of about three to four feet in diameter and place heavy stones on the top so that they may be saved from jackals, dogs, cats and such other animals. Some others do not bother about poultry-houses at all. The birds are allowed to roost on the walls of the houses where the poultry-keepers live.

But you as a poultry-keeper should go in for a better housing for your birds so that they may be comfortable, have adequate air inside, be protected from wind and sun and have freedom from too much moisture.

The house should be exposed on the eastern or south-eastern side so that a western wind is avoided. Tree plantations like mulberry and citrus are preferable. But they should not be too close to the house.

The construction of the house should be simple. It should also be free from ticks. Houses made of wood often invite tick and other parasitic troubles. The house should be easy to disinfect.

On model poultry farms chicks are reared in permanent or portable brooder houses with arrangements for artificial heating. After brooding, the birds are kept in houses made of single iron bars covered with wire netting placed under thatched roofs. A desirable size of the house is 6 ft. × 3 ft. × 4 ft. Asbestos or galvanized iron sheets may also be used for the top.

In urban areas, special poultry cages made of iron and wire netting are recommended to poultry-keepers who are keen of adopting an improved system of housing.

A hen requires approximately four square feet of floor space while a room 10 ft. × 10 ft. can accommodate 150 chicks up to eight weeks during brooding.

Many poultry-keepers fail to realize that chickens spend considerable time on the roosts. For layers, the roosts can be placed towards the back of the house about nine inches above floor level. It is good to fix circular tins containing water and kerosene on the iron rods supporting the perches, as this will provide protection from ticks during night time. Where there are rows of roosts, the space between two should be about 15 in.

Water fountains, mash hoppers, nest boxes and crates are some of the commonly used equipment in poultry houses. For brooding chicks, it is very important to use litter on the floor. For this purpose, paddy straw, wheat *bhoosa*, sawdust, sand, fallen leaves or paddy husk may be used with advantage.

Coops for breaking up broody hens are also necessary in poultry houses. The coop should give the birds access to feed and water and should be easy to clean.

If fowls are allowed to run, the soil should be sandy loam, so that there may be good drainage and grass and other green crops may grow well. When hens are allowed to run, proper laying nests are necessary. Earthen *gamlas*, 18 in. in diameter and nine inches deep, may be placed in the corners of the house for the hens to sit and lay. Three hens can be easily managed with one *gamla*. Ashes or sand with a small quantity of flowers of sulphur may be placed in the earthen vessel so that the eggs may not be broken.

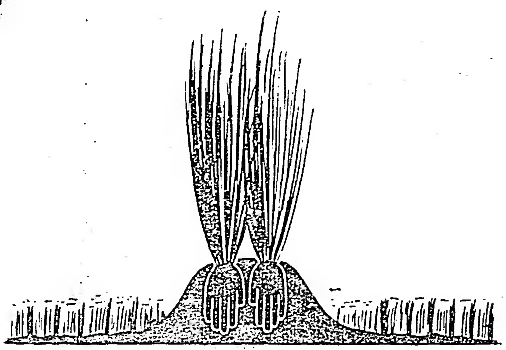
Layers may also be kept in cages or batteries for the production of table eggs. In urban areas, the use of laying batteries for backyard farming is becoming more and more popular. Hens may be kept confined in cages suitably placed in buildings up to a year. Each hen, however, is given an individual compartment, about 16 in. wide, 18 in. long and 18 in. high. This would be a good system for adoption in localities where land is scarce.

This poultry pen is a good one to copy

WHAT'S NEW IN FARMING

GRASSES ON FIELD BUNDS

FARMERS in Bombay State are being advised to grow grasses on bunds wherever contour bunding has been done by them. These grasses will not only prevent the erosion of the bunds during rains because of the vegetative cover they provide, but also will hold the earth together with their root system. The grasses will be very good green fodder for cattle too. The Bombay Department of Agriculture is prescribing such grasses as Marvel, Thin Napier, Blue Panic and Rhodes. Farmers generally allow wild type of grasses to grow on these bunds which are not useful to them. They can even grow *hariali* and *kunda* in which case a vigilant watch will have to be kept by them to keep these from spreading on to the fields. The grasses are best seeded when the monsoon sets in.



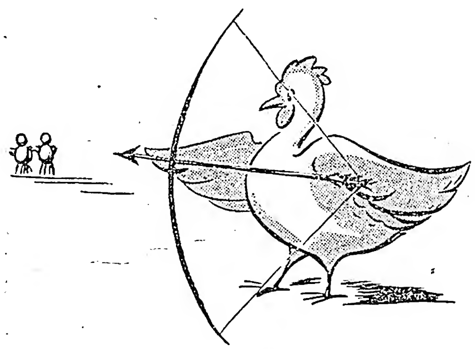
SUBSOILING REDUCES WILT

SUBSOILING operations have been found to be highly effective in the Punjab in fighting the wilt disease of gram. The operation has also been found to increase grain yield. Subsoiling can be done easily up to a depth of 12 in. during the monsoon season with a tractor plough using one bottom, weighing it down with about 200 lb.

Year before last, in an experiment, it was seen that the gram crop following the extra deep ploughing showed a remarkable decrease in the wilt disease, at the same time yielding a larger quantity of grain. Last year, the residual effect of this operation was also watched. It was found that the wilt had been reduced to negligible proportions and the grain yield had further increased. From past experience, it is clear that subsoiling beneficially affects the third successive crop of gram also. The operation, though costly, is lucrative in the long run.

TICK FEVER IN FOWLS

TICKS cause a fever in fowls called tick fever which has been found to be a serious disease, especially in the villages. One of the important sources spreading tick fever among healthy birds is the infected luggage vans of railway trains. Very often, healthy stock despatched from poultry farms by railway contact



the disease in transit and suffer heavy losses at the destination. Poultry farmers are advised that immediately a consignment of birds is received by rail, they should examine them for seed ticks on their body, especially under the wings and between the legs and pectoral muscles. If any are present, the bird should be suspected of suffering from tick fever. Veteri-

narians also advise that the birds should be dusted with insecticides such as 'Gammexane' and 'Hexyclan' which will destory the ticks. All birds infected with ticks should be got injected with the help of a veterinary doctor to put down the disease before it takes a serious form.

BLACK SMUT OF WHEAT

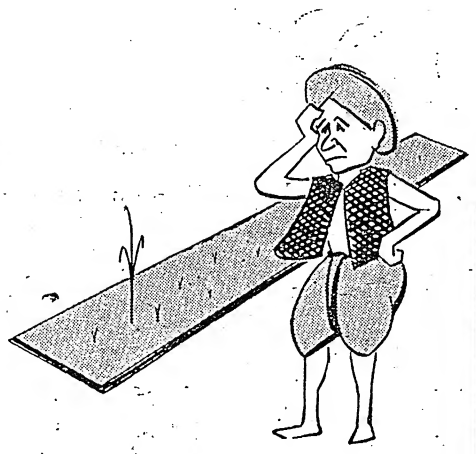
A COMBINATION of different measures recommended for the control of the black smut disease has given such encouraging results in controlling the disease, that farmers are being advised to adopt them and get smut-free wheat crops.

Black smut is a disease caused by a fungus. It is very dangerous, but since it is not only carried on the seed but also infects the soil, control is rather difficult. The disease is seen when the leaves in the late seedling stage begin showing narrow red-grey streaks or stripes running parallel to the veins. Later on, the leaves get twisted and curl and droop before withering away. The entire plant dies down early and those that survive either do not produce any ears or if they do, no grains are formed.

The three recommendations—early sowing, sowing a smut-resistant variety and chemical disinfection of disease—were combined in the new experiment tried for disease control. The crop was sown on the 27th October as against the normal sowing time of November-December. *IP 165*, a smut-resistant wheat variety, was sown. The seed was dressed with copper sulphate dust before sowing. The experiment showed that the grain by this combination treatment gave a uniform increase during the three years the experiment was conducted.

FUNGICIDES FOR PRESERVING SEED

FARMERS in certain localities have to sow their rice a little later in the season or sometimes even as late as December-January. It is their experience that the seeds stored for these late sowings lose their germinating capacity a great deal because of the wet humid months of the monsoon season. Some of them, for this reason, even get the seed from a specially sown seed plot in the main season or import it from a neighbouring drier region. Experiments at the Central Rice Research Institute at Cuttack have now shown that the rice seeds can well be preserved even during the monsoon months safely if they are treated with some fungicide. At the Institute, seed treated with fungicide retained its germinating capacity from April up to the end of October, as against the untreated seed which showed a setback in germination after June and lost it completely by October. The cost of treatment was found to be just about an anna for every 10 lb. of seed.



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A vital need of animals that gets overlooked on many farms

Water Needs of Farm Animals

by

Gurbakhsh Singh Mahal

FEW farmers appreciate the need of an adequate supply of wholesome water for livestock. Water forms an important constitutent of the animal body. It also is of absolute necessity for feeding, chewing, digestion, absorption and movement of foods within the body. Water helps the various organs in their functions and assists in regulating the body temperature.

On all farms, a supply of plentiful, fresh and pure water at all times should receive the first attention. If animals have to go too far to obtain water, they do not take the trouble to do so often and hence may not get enough to meet the needs of the body. The water should preferably be soft, though of course hard water does not cause harm and animals get accustomed to it after some time. In all cases, however, the water should be well aerated and free from dust or smell.

In the cold weather, animals are likely not to drink enough if the water is cold. It should, therefore, preferably be warmed slightly or the animals should be given the opportunity to drink more frequently.

During the hot weather, animals need more water than at any other time. This is especially true of horses and cattle at hard work because of their sweating heavily, and they need more frequent watering in the summer. However, animals warm from working, like horses and bullocks, should not be allowed to drink as much as they want till they have cooled off.

Water should be made available in clean troughs or other equipment which can always be kept clean. The troughs or utensils used should be cleaned at least twice a week. Watering troughs for animals found in towns and cities are not always clean and are likely to bring disease infection, and as such it is advisable to supply water to the animals individually from a pail.

COWS

Of all farm animals, cattle, and especially cows in milk and young growing animals, require the largest quantity of water. The average consumption of water by cattle varies from 10 to 15 gallons per head per day according to the size, the nature of food, the temperature and milk yield in the cows. Usually, cows consume four to five and a half pounds of water (including the water in their feed) for each pound of milk they yield. They may drink 80 per cent more of water in the hot weather.

Cows, as a rule, should always be watered twice a day. In severe hot weather, this may be increased to thrice daily. Cows having a free access to water at all times usually produce more milk than those that get water at some fixed hours.

HORSES

A horse will require from 5 to 15 gallons of water daily. Hot weather and hard work, however, will make its requirements almost twice this quantity. The horse needs watering thrice a day, but twice a day may be found sufficient in cold weather when it is not at work. Similarly, during the warm weather and when it is in work, the frequency should be increased to four times a day.

A horse should not be watered for at least an hour after feeding but may be allowed to drink freely while at work and even though it is sweating. If the horse is brought in hot, it may be watered immediately but should be kept moving until it cools down. The animal should be allowed ample time to drink its fill and not be led away the first time it raises its head from the water.

Watering troughs should be sufficiently high so that restless animals may not paw over the rim. Neither should the troughs have any sharp angles or corners.

CAMELS

The camel has an extraordinary endurance to go without water for long intervals though the extent of this power is sometimes rather exaggerated. He can abstain from water for many days on a single occasion, but cannot keep on working on a short water supply without breaking down. The degree of endurance to thirst varies with the breed, but a camel brought up under conditions where water is available at short intervals will not be able to stand the thirst to any large extent. However, he can be trained to withstand longer intervals between drinks than he has been used to, but unless an emergency demands it, it is not advisable to do so. The quantity of water needed per day by a camel will depend upon the nature of work and food. In our country, camels are watered

once a day in the cold weather and twice in the hot weather. In the desert areas of Rajasthan camel herds often go two or three days between drinks, but the *bhoosa*-fed camel of Bikaner is watered daily. In the cold weather, the camel should be given water at midday, while in the hot weather it should get water both in the morning and evening.

A drink given when the camel is hot after work is liable to cause disorders. It is important to note that in areas infested with the biting-fly, the camel should not be brought to a pool but be watered from a pail.

Camels usually prefer slow flowing water to the running stream and will prefer stagnant and muddy water to clean and fresh water if they are accustomed to it.

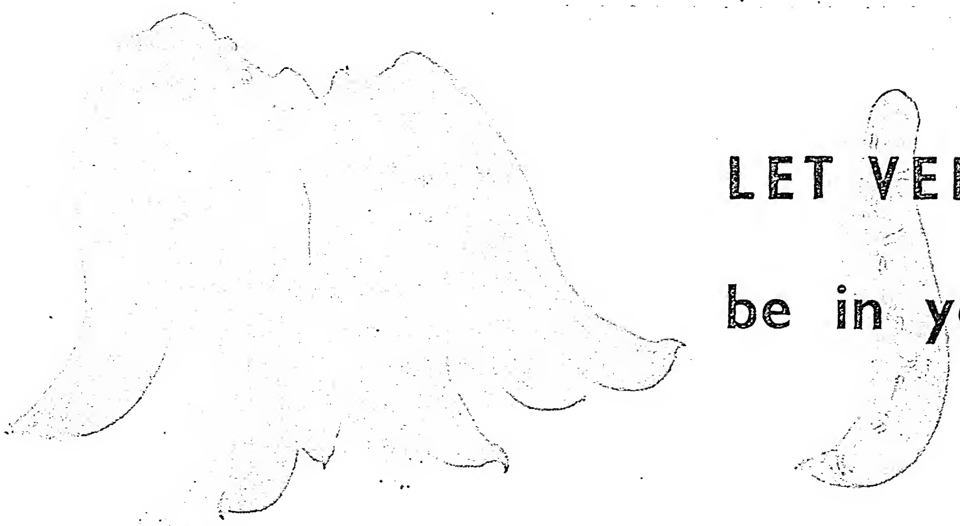
A camel consumes three to eight gallons of water per day, though of course this figure will vary under different conditions of living. After a long abstinence from water, a camel may drink over 20 gallons at a stretch. A very thirsty camel may die of over-distension after a long drink. Patience should be shown in watering the animal, as it takes its own time at it and does not drink its fill at once.

SHEEP AND GOATS

Sheep and goats are purely grazing animals and their daily water requirements will depend upon the season and the amount of water in the feed. Sheep on green grass and in winter will require a very much smaller quantity of water than when on dry feeds or during summer months. On an average, sheep and goats need $\frac{1}{4}$th to $\frac{1}{2}$ gallon of water per day. Goats in milk need more, depending on the milk yield. Experience shows that three waterings during summer and two during winter from the troughs are enough to keep them healthy. Apart from this, water should also be available in the pens at all times in small earthen troughs which keep the water cool during the hot summer months.

PIGS

Like all other classes of livestock, the pigs should always be supplied with plenty of water. The quantity of water consumed by pigs ranges from 4 to 12 lb. daily per 100 lb. body-weight. The frequency of watering should be twice daily from the trough or the pail. If pigs get plenty of water through watery feeds, such as dairy by-products, there may not be any need for providing them with water separately.



LET VELVET BEANS be in your rotation

by

SARDAR SINGH

VELVET BEANS, *Stizolobium deeringianum*, are going to play an important role as a rotation crop in Indian crop husbandry, particularly where mixed farming is practised, judged by the experience with the crop at the Institute of Plant Industry, Indore.

The Bean, besides being a good green manuring crop, forms a nutritious forage for livestock. By virtue of the cover it gives, it protects the soil against erosion and does not permit weed growth.

The Velvet Bean is comparatively new to Indian agriculture, unlike the other members of the bean family. Some believe, however, that it is a native of India, from where it was introduced to Western countries about a century ago, and where it has come to be known as an important field crop.

Feeding tests at the Institute's Farm have shown that the Velvet Bean is a nutritious and palatable feed both for milch and draft cattle. The hay contains from 14 to 16 per cent protein, while the kernel has as much as 21 to 26 per cent of it. In addition, it contains about five to six per cent of fat. This feed can, therefore, possibly replace costlier feeds such as cotton-seed and wheat bran. An expert at the Florida Research Station (U.S.A.) maintains that a ton and a half of velvet beans is equivalent to a ton of cotton-seed in feeding value.

The plant grows quick enough to cover the field thick and suppress other vegetation, including weeds of all kinds, like *kans*. The canopy formed by the plant prevents erosion, and acts as a filter to retain the fine soil particles during heavy downpours.

EASILY CULTIVATED

Even when Velvet Beans are grown for the kernel, their extensive root system can provide a liberal supply of organic matter to the soil to enrich it. As a green manure, its tender leaves and shoots get easily decomposed, and the crop can add 80 to 100 lb. of nitrogen to the soil.

Another advantage the Velvet Bean offers is easy cultivation. Seeds being quite bold and viable, a fine seed-bed is not needed for sowing the crop. It will germinate even in a cloddy field. Hence, two ploughings or *bakharings* are enough preparation for a seed-bed for the Bean.

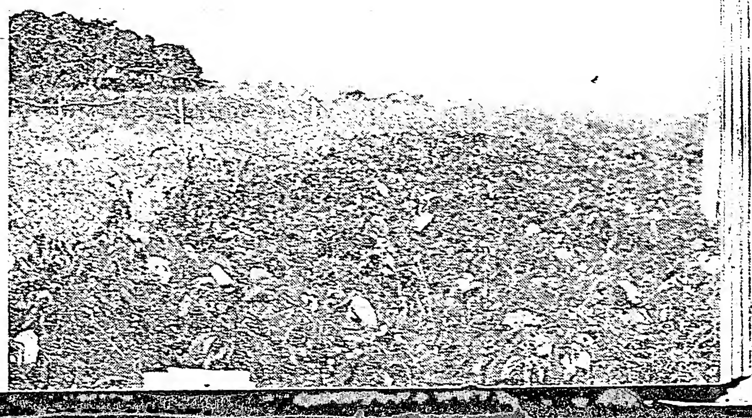
For grain, the sowing is in lines four feet apart behind the plough. Otherwise, the crop is broadcast and the seed mixed with the soil. Thirty to forty pounds of seed will give a uniform stand. In areas depending upon natural precipitation, the crop can be sown as a *kharif* crop with first showers.

Though the Bean is not as judiciously manured as other crops, it responds well to application of phosphatic fertilizers drilled at the time of sowing. No interculture is needed, as the vines grow 15 to 20 ft. long covering up the ground with their profuse foliage.

For forage, the Bean is harvested about 90 or 100 days after sowing, giving a per-acre yield of 100 to 200 md. of green fodder. For grain, it is ready for harvest in six month's time, when the pods are completely matured, as seen by the dark colour, hardness and curving of the pods.

The pods are generally picked and threshed. The yield per acre varies from 8 to 12 md. of kernel and 30 to 40 md. of dry hay.

Weeds are completely smothered because of the vigorous growth of Velvet Beans

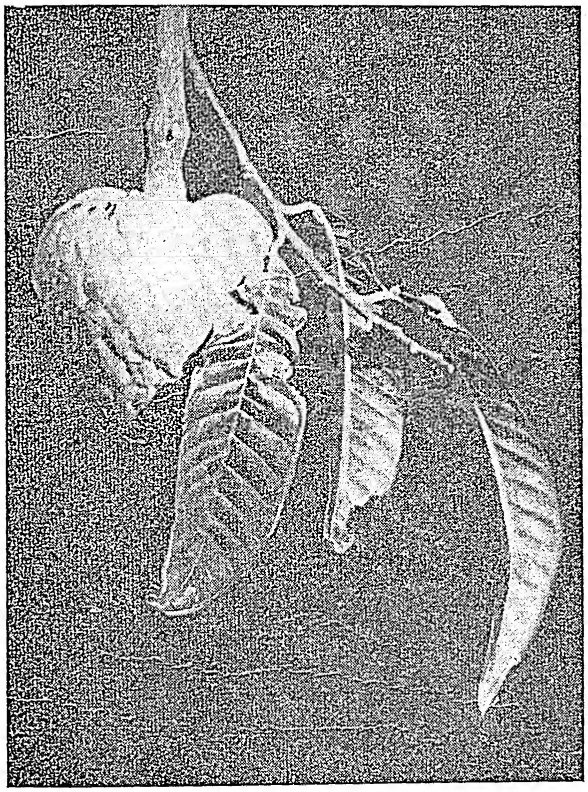


Your orchard won't be complete without a couple of *ramphals* in it

RAMPHAL *is a good fruit*

by

B. L. Choudhry



SOME people fancy *ramphal* (*Annona reticulata*), though they grow it in twos and threes and not on an orchard scale.

The fruit is of the same family as *sitaphal* (Custard-apple or *A. squamosa*) which is one of our sweetest fruits. Ramphal is also called the bullock's heart because of its appearance. It is distinguished from *sitaphal* or custard-apple and *hanumanphal* or cherimoya because of its long narrow leaves and the solid compact fruit. The fruit is red-spotted and has a creamy or custard-like pulp. However, it is inferior to both the other fruits in taste, and some varieties distinguish themselves by being even insipid.

The unripe *ramphal* is considered an anthelmentic, its bark a powerful astringent and leaves and seeds insecticidal. The pulp prepared from *ramphal* (or *sitaphal*) seeds has insecticidal properties, and when applied to the head as a paste and allowed to remain for about half an hour and then washed off clean, is effective in killing head lice.

The plant can be successfully grown anywhere in the country up to an elevation of 2,000 ft. It has no preference to any particular soil, but a medium heavy, well-drained soil gives the best results. The plant grows to a height of 20 to 25 ft.

Ramphal is a hardy plant and is raised from seeds. Special varieties can be propagated by shield or cleft grafting. Seeds can be sown in May-June. It is best to raise seedlings in pots as only a few plants are generally planted in orchards. The pots should be filled with one part of sand, one of leaf mould and one of garden soil. Two to three seeds are sown in each pot and kept in semi-shade and watered regularly. Seedlings so raised are easy to transplant and can be tossed out of the pot without damaging the roots.

METHOD OF CULTIVATION

Seeds can also be sown in the field itself. Pits for planting, measuring 2 ft. × 2 ft. × 2 ft. should be dug in May and filled with equal amounts of rich garden soil, cowdung or compost manure and sand. The spacing should be 22 to 25 ft. between two pits. In each pit, two to three seeds should be sown and when the seedlings are six to nine inches high, the best among them retained and the others removed. *Neem* oil-cake at the rate of one seer a pit may be added in preparing the pit if white ant attack is feared.

Ramphal requires to be cared for well till it establishes itself. It is easily affected by cold and frost and hence requires to be protected from these during the winter. A thatched roof with an opening on the eastern side put up over the plant will provide it with enough warmth during the cold season. Irrigation is not required during the rainy season unless there is a long break in the monsoon, but it is good to fork round the plant and apply oilcake powder at two seers a plant, depending on the size and growth of the plant.

During the winter, a profuse irrigation once a fortnight, and during the summer, once a week or once in five or six days, will be required. In subsequent years, the irrigation interval should be increased so that

(*Continued on page 21*)

GRADED EGGS CAN RAISE YOUR PROFIT MARGIN

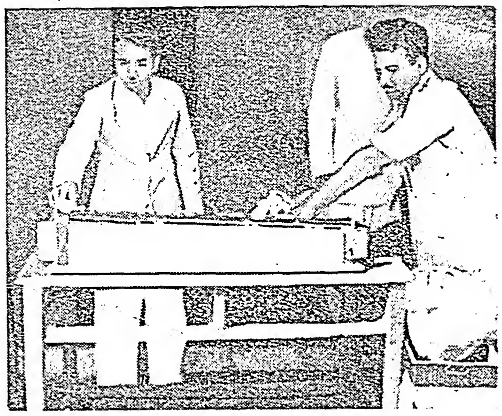
One problem of marketing that needs equal consideration from the egg-seller as well as the consumer

by
H. S. BAWA

MORE egg-dealers are going in for Agmark grading of their eggs today than they did in 1948. In 1953, over 97,00,000 eggs worth over Rs. 10,46,000 were graded by the dealers as against about 36,76,000 eggs worth about Rs. 420,000 in 1948.

Grading by the Agmark standards is becoming more popular because it means more money for the seller and the money's worth for the buyer.

Egg-dealers, who can satisfy the conditions laid down by the Directorate of Marketing and Inspection under the Agricultural Produce (Grading and Marketing) Act of 1937 get certificates of authorisation for grading their eggs and marking them with the Agmark stamps showing the various grades.



This is how eggs are machine-graded at the Mysore Station

Agmark seal being put on graded eggs at the Mysore Egg Grading Station

Grading is done, as per standards laid down, according to the internal quality and weight of the eggs. Hen and duck eggs are graded under Agmark into four grades: 'Special', 'A', 'B' and 'C'. The minimum weight prescribed for each of these grades is 2 oz., $1\frac{3}{4}$ oz., $1\frac{1}{2}$ oz. and one ounce for hen's eggs and $2\frac{1}{2}$ oz., 2 oz., $1\frac{3}{4}$ oz. and $1\frac{1}{2}$ oz. for duck's eggs. Specifications for the internal quality for all grades are, however, the same.

Apart from grading, eggs should reach the consumer in a good and edible condition, and the huge waste occurring due to deterioration and spoilage eliminated or reduced if full benefits are to be obtained. This means the eggs must be intelligently handled from the time they are laid till they reach the consumer's table, and the entire marketing process speeded up.

CLEANING AND CANDLING

Under Agmark, all eggs are cleaned and candled before grading. Dirty eggs deteriorate sooner in quality than the cleaned ones, as the bacteria get into the eggs through the pores. If washed, the water helps carry the bacteria through the shell, resulting in mould

formation. Eggs are generally cleaned by steel wool or emery-cloth, but a cheap alternative generally adopted are pieces of *baan* or *munj*. Very dirty eggs are by warm water at about 100°F.

Quality is determined by four primary factors: condition of the shell, size and condition of the air cell, condition of the yolk and condition of the white. All these excepting the shell being inside the egg, their condition is determined commercially by a process known as candling.

Candling consists of holding the egg before a suitable light, usually artificial, in such a way that the rays of light penetrate the egg to a great extent, making it possible to observe the condition and behaviour of the contents.

GRADING IN MYSORE

Grading of eggs under Agmark not being compulsory, only a small percentage of eggs produced in our country is graded. Taking into consideration the perishable nature of the eggs and the safeguarding of the consumers' interest, making grading compulsory, as has been done by the Municipality in Mysore city, may be found highly beneficial.

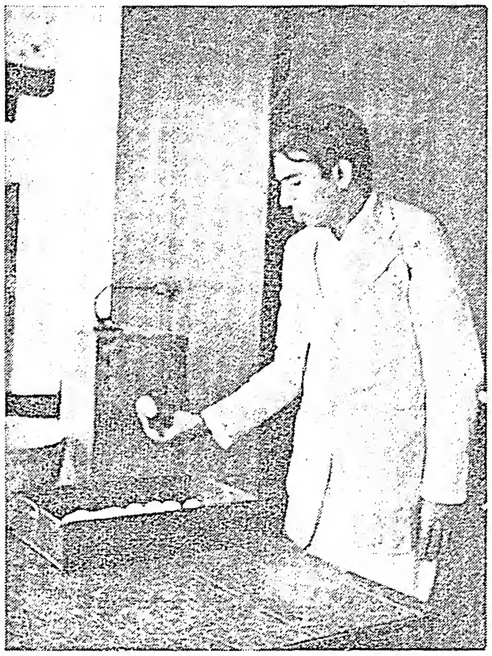
The compulsory grading of eggs in Mysore city under Agmark was started in October 1947, under Section 51(1) of the Municipal Act of 1933.

The Municipality collects from the sellers a small fee of three annas per hundred eggs for grading. All eggs are brought to the Grading Station before sale. Each graded egg is marked by an Agmark grade. The inspection staff visits the shops to see that no ungraded eggs are sold.

The expenses of the Egg Grading Station are met from the collection of grading fees. Such a scheme with suitable modifications can easily be adopted by other municipalities. The staff of the State Marketing Departments periodically pays surprise visits to the graders' permises to check if the grading and marking of eggs under Agmark is done correctly or not.

The Madras State Government has fixed the grading charges on eggs and oranges at eight annas for every thousand or part thereof to provide for an efficient inspecting service and to meet the expenses on quality control, and have made it incumbent on holders of certificates of authorisation for grading to pay these charges.

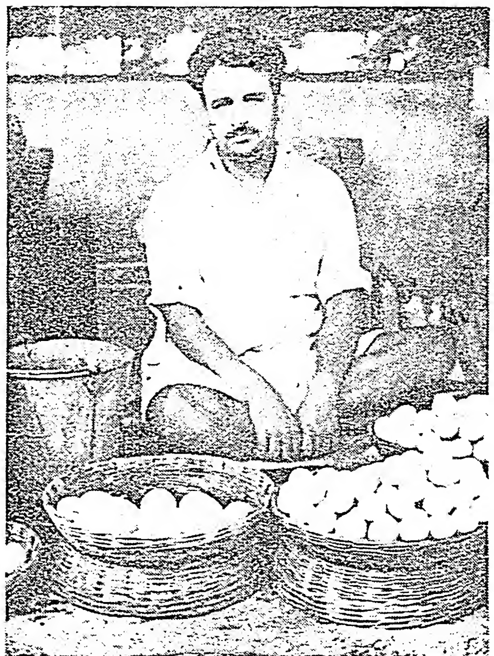
Big scope exists for organising producers' egg marketing co-operative societies in areas of high production, and at such centres the grading of eggs could be introduced with advantage. Graded eggs sell at a premium of five to ten per cent over ungraded eggs.



Eggs being candled at the Station

☆

Graded eggs kept for sale in the Mysore market



impress them with talk and action

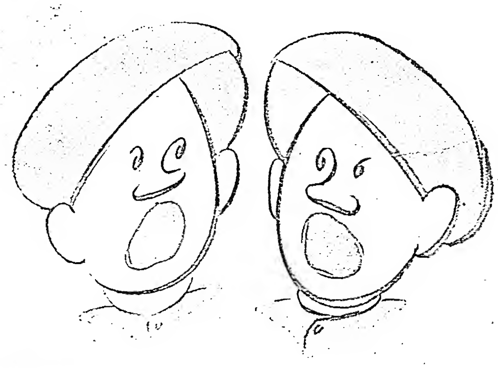
On the way you talk and act depends whether you win over the villager or lose him

IN many cases, the village worker will have to get *individuals* to adopt certain simple improved practices before he can expect to achieve village group action; examples: better feeding of bullocks, using better seed or better sanitation in the home. The best way to do this is by establishing direct contacts with the farmer.

Direct contacts are established with villagers by getting acquainted with individuals or just visiting people and sitting down for discussing village problems, or even just for gossiping. Other direct contacts are made in meetings where you are called upon to talk, or on tours, or in personal visits to demonstrators, and so on. Efforts in every case, however, should be directed towards achieving your goal.

GETTING INTO CONVERSATION

Visiting people and getting into conversation with them is the simplest and most inexpensive way of achieving direct contacts, though it may prove to be time-consuming. To be successful in conversation, take care that you engage people when they want to hear you, and that you allow others to do most of the talking. Be prepared to learn as well as instruct, for when people feel that they are able to contribute to your knowledge, they are more inclined to talk to you.



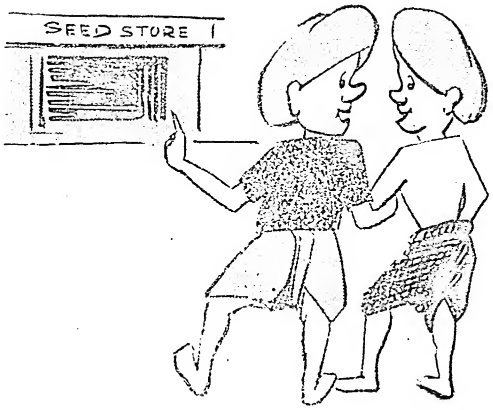
Be accurate in your statements and keep others' interest in view while talking. Don't interrupt when others are speaking, so that you allow the other man to receive credit for good ideas. Don't try to argue, as you are sure to lose friends if you do. Display a cheerful disposition throughout the conversation, using natural and easy language, so that you leave the group or person as a *friend*.

MAKING FRIENDS

Sometimes, you may have to develop actual friendship with the farmer whom you want to adopt a new practice, say, using better seed. The first step in that direction would be to get acquainted with him and then gradually develop this acquaintance into a friendship.

Then you could introduce the subject you want to get your friend interested in in the course of a friendly talk, getting your friend's ideas while expressing your own side by side. Show him photographs, if possible, and give him literature also if he happens to be literate. Take him to a demonstration showing what improved seeds will do, if one is available, even if you have to go to a neighbouring village for it.

When your friend has accepted your viewpoint, and is ready to give a trial to your suggestion, don't think that your job is over. You have to help him find the source of such seed and lead him to make the actual purchase. Also help him decide exactly when and how the seed should be sown, and keep in constant



touch with him to give all the additional assistance he needs.

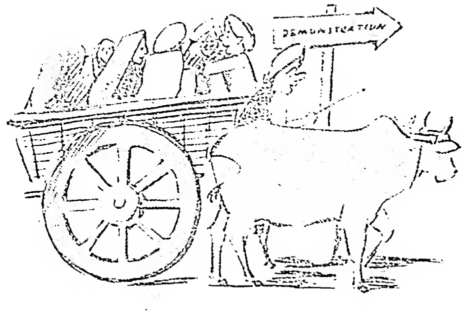
Before undertaking this task, however, make sure that you yourself are certain about every step in the production of a crop by the use of improved seed. If you have any doubt, remove it by consulting reliable experts or references, for your future depends on giving the *right* guidance.

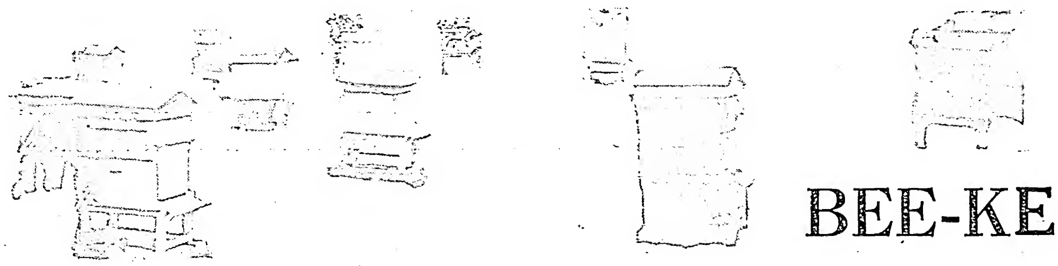
TOURS

Tours, like any other teaching aid, must also have a definite purpose, such as seeing the result of a new practice, seeing a new practice demonstrated, seeing the operation of a new implement or tool, or seeing what other villages have accomplished, such as co-operative sanitation.

Tours should be *planned.* They must help people recognise the problem, create interest among them, generate discussion and provoke action. Before going on a tour, make sure what you are going to show or teach, what tools, etc., will be necessary, who will go on the tour, date and time of the tour, whether drinking water, shade and other conveniences are prepared, what transportation is needed and what refreshments are to be served.

These arrangements complete, you must notify villagers of the decisions. A tour may be called successful if everyone could see and hear you, if time for questions and answers was given, if village people participated, if there were no accidents and if the people did not get tired of you.—*From the forthcoming publication " Extension Guide for the Village Worker"*





BEE-KEEPING IS THE SWEETEST HOBBY YET

An art simple enough for the smallest fellow in the family to learn

by
R. N. Muttoo

THE honey bee, known to man since the earliest times, produces honey, a food of high nutritive and medicinal value. It also produces bees-wax, which finds many uses in industry.

But what is not so well-known about the honey bee is that it also helps pollinate a great number of our crops, thus leading to increased crop-yields. Several varieties of fruits, legumes, oilseeds and cucurbitaceous vegetables benefit from this activity of the bee. Scientists today hold the view that the service that the bee renders to the human race lies not so much in the production of honey as in pollinating and thereby increasing the production of ~~field~~, vegetable and fruit crops.

The art of keeping bees in a rational way, employing them with profit to the keeper is bee-keeping.

The old method of honey production is cruel, unhygienic and uneconomic. It consists of periodically destroying the bees and their nests and squeezing out the honey out of the combs. The combs not only contain honey but also pollen and larvae, and when crushed, these get mixed with the honey along with the dirt and sweat of the hands. Such an extraction, apart from resulting in the production of honey which is unhygienic also results in the destruction of the bees and their combs.

By following the modern method of bee-keeping, however, not even a single bee or a comb need be destroyed. Honey can be extracted with the help of a simple machine, and untouched by hand. This makes it possible to use the same bees for producing honey season after season and for an indefinite period.

The honey bee does not possess what we call intelligence, but works by instinct. It cannot be tamed as we tame and keep a dog, a cat or a cow. A study of their habits and behaviour, therefore, will help in getting the maximum advantage out of them.

A SIMPLE ART

Bee-keeping on a small scale does not involve much of capital. Initially, the only expenditure needed is for the purchase of hives and other tools. Thereafter, only a small expenditure is needed for maintaining the hives.

Anyone, old or young, can keep bees with profit. The labour involved in bee-keeping being light, it can be a highly suitable occupation for women and children.

Bee-keeping can be made one's sole source of income, but it is best taken up on a small scale as a cottage industry to attend to in one's spare time, and either to provide honey for one's own use or get a supplementary income out of it by sale.

Anybody can keep from 2 to 20 hives without any strain on one's capital, resources, space, labour or time.

In bee-keeping, bees are the labourers. The bee-keeper's labour consists of a few intelligent manipulations, three or four times a month. Even a score of hives will not take more than half a day's time of the bee-keeper in a week.

Bees can be kept at any place where there is sufficient bee pasture of shrubs, fruit, orchards and cultivated crops. They can not only be kept in rural areas, but also in big cities. The popular notion that they do not thrive in the hills is not correct.

Bee-keeping does not require any land. Bee-hives can be kept in one's courtyard, in the verandah of the house or even on the roof.

NECTAR

The raw material required for honey production is the sweet juice produced by flowers called nectar. While all flowers do not produce nectar, among those which do, some secrete more and some less. Those that produce a large quantity of nectar are the ones most useful for honey production. Here are a few which produce good nectar: apples, pears, apricots, plums, guavas, citrus, *jaman* (*Eugenia* sp.), plantain, *loquats* and persimmon among fruits; *sarson* (*Brassica* sp.), legumes, buck-wheat, cotton and coffee among field crops; *tun* (*Cedrela toona*), *shisham* (*Dalbergia sissoo*), *semal* (*Bombax malabaricum*), soapnut, wild cherry, tamarind, eucalyptus, *sal* (*Shorea robusta*), bottle brush, horse chestnut and Indian elm among forest trees; beans, cucurbitaceous plants, lady's finger and radish among vegetables. Some weeds and wild shrubs also provide nectar to the bees.

Besides nectar, flowers also produce pollen which forms a nitrogenous food for the bees mostly for feeding young ones in the larval stage. Some flowers secrete nectar and also provide pollen. There are others which provide only pollen. The number of such trees is very great.

There is no difficulty about finding a market for honey. The demand is already great in the country.

Bee-keeping can be a very pleasant and fascinating pastime and has an excellent educational value both for the young and the old.

Bees form a beard

(*Continued from page 15*)

when the tree is full-grown and bearing, it receives one irrigation a month in winter and one a fortnight in the summer.

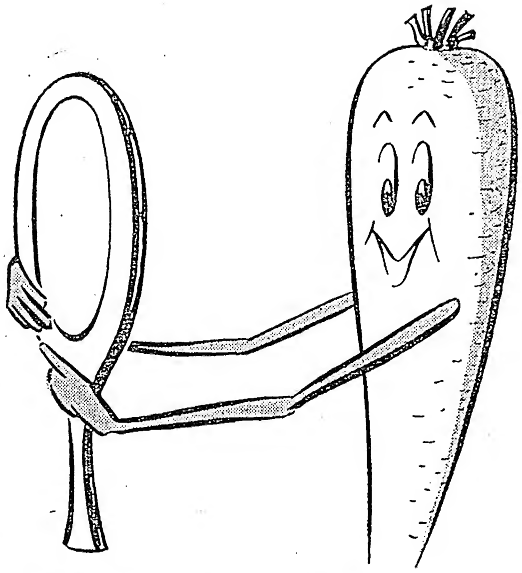
The tree grows up into a graceful form and will not require any pruning, but if it shows a tendency to put on more vegetative growth at the expense of fruiting, a mild root pruning may be given.

The tree starts fruiting in about four to five years and is a shy bearer. A full-grown and well-bearing tree produces a maximum of 75 to 100 lb. of fruits. This is a handicap in commercial fruit production and stands in the way of the fruit being grown on a large scale.

There are no standard varieties of *ramphal*. The Agri-Horticultural Society of India has a strain called *Society's Hybrid*, which has a superior fruit quality, being less sandy than the local types. An excellent fruit-yielding plant (variety not known) is seen growing in the students' garden of the Hindustani Talimi Sangh, Sevagram.

Ramphal will serve as a novelty in any homestead garden of a pretty good size.


Firestone
CHAMPION TRACTOR TYRES
FOR GETTING DOWN TO EARTH
Firestone



PREPARE YOUR VEGETABLE EXHIBITS

WHEN next you exhibit your vegetables at any show or exhibition, besides uniformity in shape and colour of your produce, remember that there is another factor that counts—your exhibits must bear a presentable look, or, as you would call it, have a proper 'finish'. Here is what you should do.

In case the exhibition is being held during the season of full growth, exhibit your carrots and beet root with their full complement of foliage, if good. Any damaged or withered leaves should be cut-out neatly and carefully.

The leaf-stalks of beet root, however, should not be cut, but twisted off gently, fairly close to the crown. This will avoid bleeding. To give the beet root a tidy look, neatly char the severed ends over a candle flame or a lighted taper.

If you are one of those who store these roots in sand, use soft sand for the purpose. When you lift them out, gently remove any particles of sand adhering to them with a piece of soft flannel slightly moistened with olive oil; but don't use too much oil.

You may have to carry vegetables sometimes when the show is held quite a distance from your garden. Then select a receptacle big enough to hold your exhibits without having to crowd them in. Pad its bottom properly and place pieces of clean tissue paper over the padding, taking care that all the sides and ends are also well-covered with paper.

If you want to exhibit perfect specimens of vegetables, pay attention to the main factors: procurement of high quality seeds of the best variety, intensive cultivation and judicious manuring. Personal care and supervision of the crop are also very essential.

No doubt, these considerations far exceed the essential demands of utility and involve a complete disregard for economy. But then, exhibits are exhibits.

FARM BULLETINS

To meet the paucity of literature in a simple, yet authoritative form, the Indian Council of Agricultural Research has planned a series of bulletins dealing with farming and animal husbandry subjects. Each of the Bulletins is so written as to give a general picture of farming practices in vogue in the country, and suggest improvements based on research results. The Bulletins will be found useful by the farmer, the agricultural student and the Extension worker alike.

Farm Bulletin No. 1. Rice Cultivation in India (*Price As. 4*)

Farm Bulletin No. 2. Groundnut Cultivation in India (*Price As. 4*)

Farm Bulletin No. 3. Onion and Garlic Cultivation in India (*Price As. 4*)

Others under preparation in the Series:

- Goat-keeping for Profit
- Tobacco Cultivation in India
- Cotton Cultivation in India
- Potato Cultivation in North India
- Sugarcane Cultivation in South India
- Wheat Cultivation in India
- Bee-keeping in India
- Sericulture in India
- Management of Farm Animals
- Poultry-keeping in India
- Maize Cultivation in India

If you like to be kept informed of these publications as and when they are out, please write to:

The Secretary,
Indian Council of Agricultural Research,
Jamnagar House, Mansingh Road, New Delhi-2

NEW BOOKS RECEIVED

Weeds in Indian Agriculture

By Chandrika Thakur; published by Motilal Banarsidass, Publishers & Booksellers, Bankipur, Patna; first edition, 1954, pp. XV+125 with 53 plates; price Rs. 7-8.

A treatise on 106 weeds commonly found in the plains of northern India.

Special Independence Day Number of the "Bulletin" issued by the Indian Central Coconut Committee, Ernakulam

(Annual subscription Annas 6, single copy Anna one only)

Rural Progress Through Co-operatives

Published by the United Nations Department of Economic Affairs, New York; pp. VI+112; price $ 0.75; available in India from Oxford Book & Stationery Co., Scindia House, New Delhi, also, 17, Park Street, Calcutta, *and* P. Varadachary & Co., 8, Linghi Chetty Street, Madras 1.

The Economic Weekly

A Journal of current economic and political affairs published by the Asian New Age Publishers Ltd., Noble Chambers, Parsee Bazar Street, Bombay 1.

Statistical Statements relating to the Co-operative Movement in India, for the year 1951-52

Published by the Agricultural Credit Department, Reserve Bank of India, Bombay; pp. A to I+101; price Rs. 3.

GREEN PEAS

by

H.B. SINGH and S.M. SIKKA

With this new knowledge on green peas you should be able to pick more basketfuls of them at the next harvest

GREEN PEAS occupy an important place among the winter vegetables grown in India. They are not only rich in proteins, but also serve as as excellent source of vitamins, phosphorus and iron.

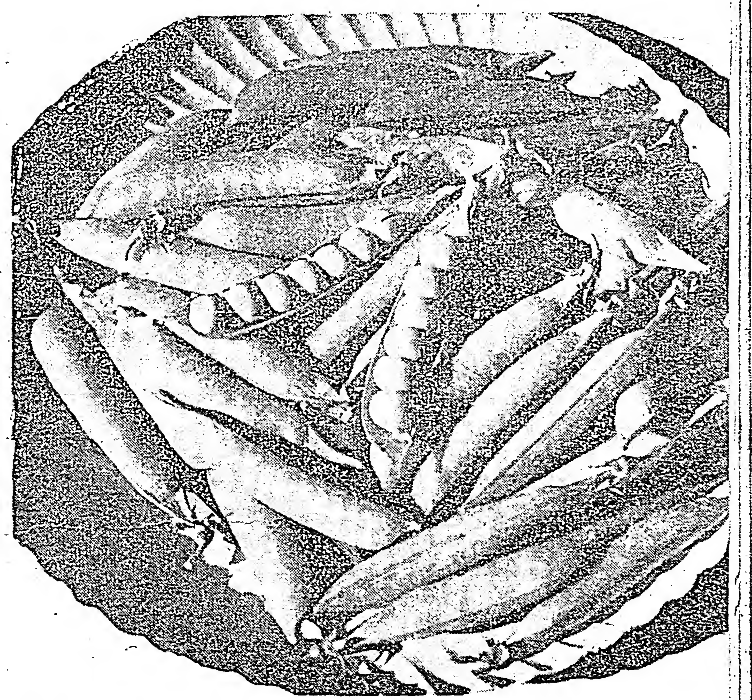
Green peas are grown on a commercial scale chiefly in the Punjab, Delhi, Pepsu, Uttar Pradesh and Himachal Pradesh, and to some extent in Bihar, West Bengal, Orissa, Madhya Pradesh and Bombay. In the plains of northern India, the cultivators of Lucknow and Meerut in Uttar Pradesh and Ambala, Hoshiarpur, Attari and Amritsar in the Punjab have specialized in the cultivation and marketing of peas. In the north Indian hills, both summer and autumn crops are raised and a part of the produce is marketed down to the plains from April to November.

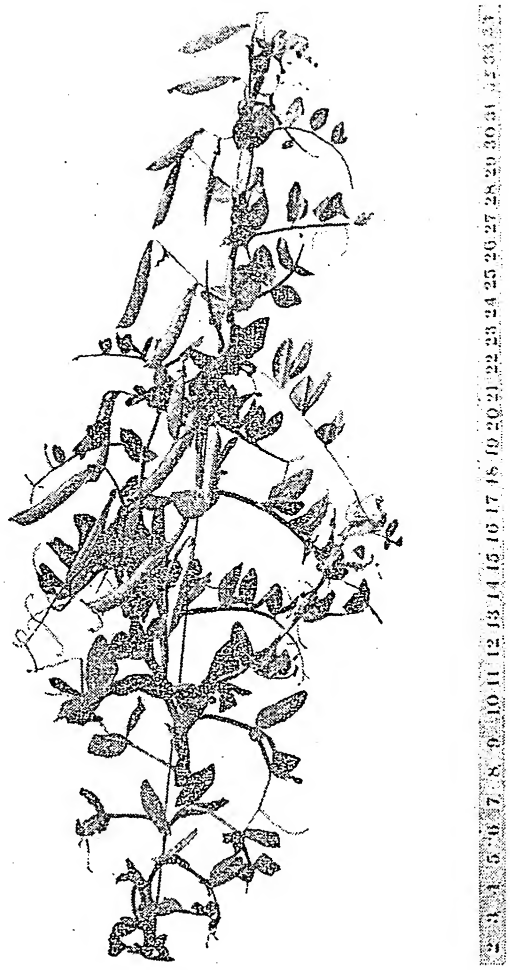
A large number of varieties of the garden pea are listed by the Indian seedsmen, but so far as the varieties under commercial cultivation are concerned, it may be said that there are not very many. The growers in the Punjab cultivate the green-seeded *Hara Bauna*, also known as *China* and the white-seeded *Desi Bauna*, also called *Lucknow Boniya*, for the early crop, and the mid-season medium tall varieties *Farshi* and *Do Futta* or *Kirpan* for the main crop. The latter mid-season variety is in fact the English canning variety *Lincoln* or *Greenfeast*. Both *Farshi* and *Do Futta* are wrinkle-seeded, but whereas the former is double-podded, the latter bears pods mostly singly. In Ambala, a fine crop of non-irrigated peas called *Kali Nagini* or *Simla* is grown. It is a white-seeded variety with a black eye (hilum). This is also the variety grown in Himachal Pradesh. In Ambala is also grown *Desi Bauna*. In Meerut, *Desi Bauna* and *Darantia Kaip* (actually, the *Do Futta* or *Kirpan* of Amritsar) are grown on an extensive scale. A somewhat taller growing wrinkle-seeded variety named *Khaparkheda* is popular in some parts of Madhya Pradesh due to its sweetness. The green pods of the grain type of pea commonly grown in Delhi and western Uttar Pradesh mainly as a non-irrigated crop in the *sailab* lands, are also used for culinary purposes.

As a result of careful studies made at the Indian Agricultural Reserch Institute, New Delhi, the Institute is now in a position to recommend some really fine improved pea varieties for raising early and main season crops. The varieties which have been selected from a large collection of foreign types imported from abroad and collected from seedsmen, State Departments of Agriculture and cultivators in India are: *Asauji*, *Early Badger*, *Delwiche Commando*, *Bonneville* and *N.P.* 29.

'Asauji': This variety is a selection from the local mixed sorts of *Hara Bauna* or *China*, and has been specially selected for sowing the early crop about the middle of

This is 'Bonneville'. The variety produces well-filled pods which give a high shellout percentage





'Bonneville' is a medium tall variety which fruits prolifically

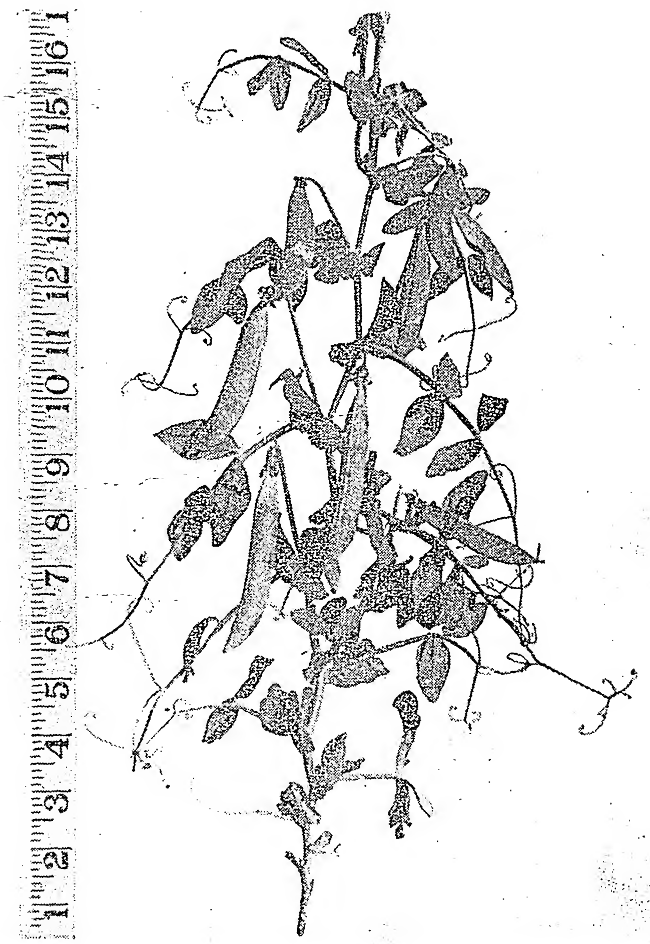
September. It is a dwarf type growing to a height of about 15 in. The average number of pods borne per plant varies from five to seven. The pods are dark green in colour, curved, about three inches long and well-filled with six to seven peas per pod. The green pods give a shellout percentage of 40. The pods are ready for the first picking in about 60 days. The seeds are mostly round and bluish green in colour.

'Early Badger': This is a foreign variety introduced from America and is especially suitable for sowing in early October when the weather cools down a little. It is a dwarf, wrinkle-seeded variety which gets ready for the first picking in 60 to 65 days after sowing. The pods which are about $2\frac{3}{4}$ in. long are borne mostly singly. Well-filled pods, boldness of seed and sweetness of the green peas are its special merits. It gives a shellout percentage of 40, and about 100 pods are contained in one pound weight.

'Delwiche Commando': This is also an introduced variety from America and is suitable for sowing of the main crop from 15th October to 15th November. The plants are medium tall, bearing generally two pods per peduncle. The pods are about three inches in length and are well-filled. About 130 pods are contained in one pound weight, and the shellout percentage is 45. The green pods are ready for picking in 80 to 85 days after sowing. The seeds are wrinkled.

'Bonneville': This variety too has been introduced from America and differs from *Delwiche Commando* in that it grows a little taller and is more prolific in bearing. The pods are about $3\frac{1}{4}$ in. long which get ready for the first picking in about 85 days after sowing. The shellout percentage of green pods of this variety is high, being 48. About 100 pods weigh one pound. The seeds of this variety are also wrinkled.

The dwarf variety 'Asauji' produces well-filled pods of good length early in the season



'*N.P. 29*': This is another wrinkle-seeded variety which was evolved at the Indian Agricultural Research Institute some years ago. This is a very high-yielding variety but is comparatively late in fruiting, the pods being ready for picking in nearly 100 days after sowing. The green peas are very sweet in taste. Generally, about 125 pods are contained in one pound weight. The shellout percentage of this variety is the highest, being nearly 50.

With a view to realising maximum production from these varieties, it is essential to sow the varieties at a time for which they are especially suitable. It will not generally pay to sow early varieties like *Asauji* and *Early Badger* for a main season crop. As regards sowing of main season varieties, the best results are likely to be achieved when they are sown between 15th October and 15th November, but their sowing can be extended up to 15th December in the farther north.

'*N.P.29*', *a high-yielding double-purpose variety for green peas as well as dry peas*

PREPARATION OF LAND

Peas can be grown on a variety of soils, from light sandy loam to clay, though the best results are achieved on well-drained, loose, friable, loamy soils. Whereas the crop can tolerate a certain amount of alkalinity in the soil, it does not do well in acidic soils. The soil should be ploughed to a fine tilth before sowing the crop.

Peas give good results in fertile soils. An application of eight cartloads of well-rotten farmyard manure, 300 lb. of superphosphate and 50 lb. of sulphate of potash at the time of preparing the land for sowing, is recommended. Efforts should be made to drill the mixture of fertilizers deep into the soil, near the root zone, in preference to surface application. The crop should be fertilized with about 100 lb. of ammonium sulphate during its growth period by applying the fertilizers in two doses, one in the early growth period and the other at the flowering stage.

SOWING

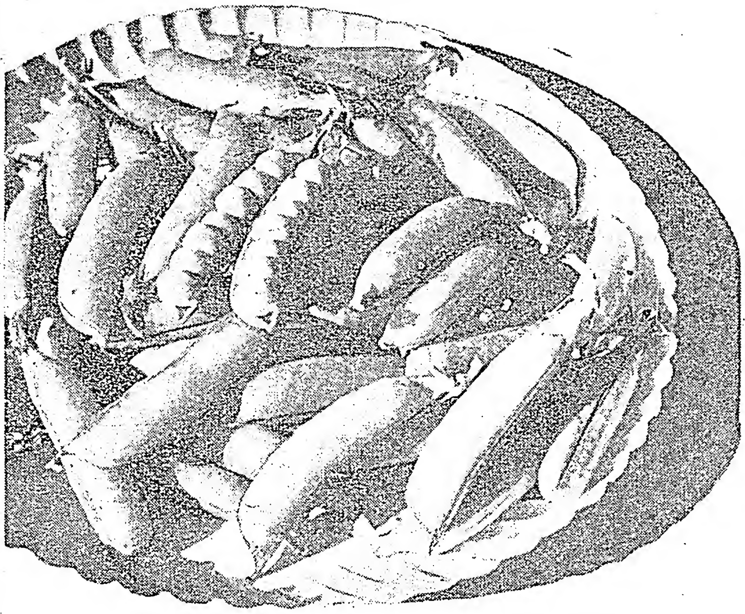
The pea crop can be sown on flat as well as raised beds. The latter method is to be preferred for effecting economy in irrigation water. The width of raised beds should be adjusted in accordance with the time of sowing and the variety. For varieties like *Asauji* and *Early Badger* sown early in the season, the raised beds should be two feet wide, whereas in the case of the varieties suitable for raising the main crop (i.e., from 15th October onwards) this width can be increased to three feet. The seeds should be planted on both sides of the beds at a distance of one inch to one and a half inches in the case of the early varieties and two to two and a half inches in the case of the main season varieties. In the crop sown on flat beds, the distance between the furrows should be one foot in the case of the early varieties and one and a half feet for the main season varieties. While sowing the crop, care should be taken not to sow the seeds too deep. Generally, a depth of one and a half to two inches is considered adequate for this crop with a view to obtaining best germination.

Amongst the early varieties, 70 lb. seed for small-seeded varieties like *Asauji* and 80 lb. for the bold-seeded varieties such as *Early Badger* would be adequate to sow an acre. In the case of the main season varieties which are sown more widely-spaced, however, the quantity of seed for one acre would be 55 to 60 lb. only. In all varieties characterised by wrinkled seeds, the seed should preferably be soaked in water overnight before sowing to hasten germination and to ensure a uniform stand of the crop. On a kitchen garden scale, a 100 ft. row can be sown with about one pound of seed.

It would be advantageous to make periodical sowings of the crop at 10 to 15-day intervals to prolong the harvesting period of green pods and also to facilitate the picking of pods.

AFTER-CARE

The September-sown crop sometimes gets the advantage of the late showers. During the dry period



Boldness and sweetness of green peas are the chief characteristics of 'Early Badger'

after the rains, irrigation is required once in 8 to 10 days till the weather cools down sufficiently, after which the plots can be irrigated once in 20 days or so. The main season crop, if sown after irrigation, would need one or two irrigations in the pre-flowering stage and two irrigations during the fruiting period. The crop should not be starved of water when the young pods are developing. Adequate irrigation during the frosty weather is also essential for saving the developing flowers and pods from frost damage. Hoeing should be done two or three times in the early growth period ; this operation mulches the surface, thus helping to conserve moisture. In the later stages of growth, occasional weeding will suffice.

HARVESTING THE CROP

The green pods are hand-picked in this country. A good number of pickers are therefore necessary. A good picker should ordinarily harvest 300 lb. or more pods per day; three to four pickers are thus required for picking the crop from one acre. Some growers prefer a continuous harvesting season while others prefer to have the entire field picked in one or two days and then stop until the field is ready for another picking several days later. The plants should be handled gently during picking to extend the fruiting period, as, if the haulms (vines) are damaged during pickings, the remaining pods will not develop properly.

The per-acre yield of green pods varies with the variety, time of sowing and fertility of the soil. The varieties grown early in the season yield less, generally 30 to 40 md. per acre. The second early varieties like *Early Badger* which are to be sown in early October are capable of yielding up to 75 md. while the mid-season or main season varieties yield more, the average yield being 100 to 125 md. per acre. In small plot trials (100 sq. ft.), a good crop of *Early Badger* gave a yield of 7,845 lb. (96 md.) per acre, the corresponding yield of *Delwiche Commando* being 13,525 lb. (165 md.). In both these varieties, there were eight pickings spread over a period of 45 days.

SEED PRODUCTION

Pea is normally a self-fertilized crop, and as such it is easy to maintain the purity of the varieties. It may, however, be pointed out that the pea plant has generally been observed to be unstable; it throws out off-type plants, in some cases rather frequently. If such rogue plants are not removed from the seed crop, considerable admixture may result in course of time. It is, therefore, desirable that the seed crop be examined at the flowering time and also at the maturity stage, and finally, the seeds also examined to detect the presence of any off-type seeds.

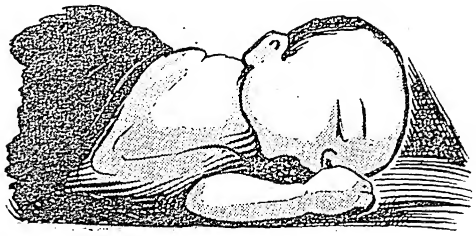
The yield of seed, like the yield of pods, also varies with the variety. Early short duration varieties like *Early Badger* yield, on an average, 600 to 700 lb. per acre, whereas the mid-season varieties such as *Delwiche Commando* and *Bonneville*, and late verieties like *N.P. 29*, yield 1,600 to 2,000 lb. The seeds, if properly stored, can remain viable for about three years.

PESTS AND DISEASES

Amongst the insect pests, the pea aphid makes its appearance when the weather starts warming up. The extent of the damage caused by aphids depends on their number which sometimes increases rapidly. Frequent applications of nicotine, either in spray or dust form, or spraying with soap solution (one pound in six gallons) will control this pest. The grubs of the pea moth feed inside the pods causing damage to the developing peas, thus spoiling the contents of the pods. Spraying with ½ to ¼ per cent D.D.T. emulsion at 120 to 140 gallons per acre controls the pest.

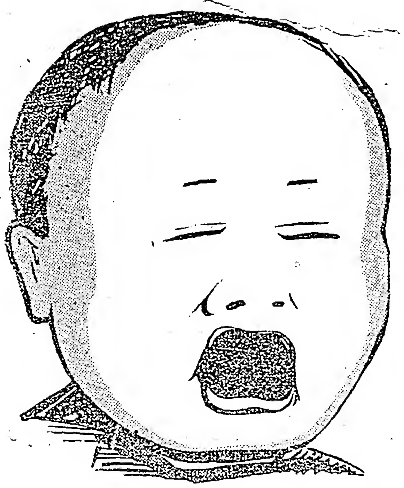
Amongst the fungus diseases, mildew (white deposit on the leaves) appears late in the season. One or two applications of finely powdered sulphur will help to keep it in check.

Mice and birds damage the pea crop badly. Mice destroy the seeds before germination and birds pick out seeds from the developing pods. The crop needs to be protected from them to yield well. In kitchen gardens, it may be possible to give a cover of wire-gauze to the pea plot to save it from bird damage.



Grandma's advice—is it right ?

any problems with your baby?



MOST young mothers rely on some elderly woman in the house to tell them about how to solve the problems they meet regarding the new baby. No doubt, it is good to have somebody who has the experience to decide things for you, but it may be that the sombody is just wrong in his or her judgment sometimes. Check up below and see for yourself how much wrong old grandmother in the house can be sometimes.

Let us begin with baby's bed. You can make it up with whatever material you have for this purpose, but the surface on which a baby sleeps should be firm and flat so that he can turn his head easily from side to side. A folded blanket will be snug and flat. Don't use the pillow for a mattress because it is too soft. Quilts are not suitable for covering a baby's bed. They are heavy, and do not enclose the warm air from the baby's body as well as blankets do. When tucking the baby, tuck in the blanket that covers the baby under the mattress at the sides but allow enough room so that the baby can move freely. The blanket should not come up close round his neck because you want him to be free to turn his head and get plenty of air.

Baby needs a lot of sleep. Sleep refreshes and protects him so that he can grow up and develop well. He will sleep peacefully if he gets what he needs to eat and is content and well. With good sleep he will store up energy for his waking time activity. So, build up his sleeping habits well.

SLEEPING HABITS

How much sleep does a baby need? Since one baby is different from another, there cannot be a set answer, but the baby needs as much sleep as he can take.

At the start, his sleep will be irregular. In 24 hours, it may be that he has 18 to 20 periods of sleeping and as many of waking. As he grows up, the sleep periods get longer and as he begins taking larger quantities of food he stays asleep longer.

As he grows up further, he stays asleep longer at a time, and when he is six months old he may be sleeping 12 hours at night and perhaps three to five hours during the day.

How one wishes that the long sleeping periods that he has may come at night but, no, he has his wakeful spells right in the middle of the night. If you have this bother, probably keeping him awake a little while at convenient times during the day or early evening may make him sleepier at night.

How does your baby sleep, on his back or his stomach? Either one is alright and no need to worry. The back of the head of a baby who always sleeps on his back may get a little bit flattened, but that again should not worry you. It will get into shape as soon as he is old enough to sit.

It is perfectly safe for baby to sleep on his stomach if the mattress is firm and flat and he can move his head from side to side easily.

Don't keep the baby restless by keeping him too warmly covered. When you feel his hands or feet, you may find them slightly chilly to the touch, but this does not mean he is cold. The right thing to do would be to feel his body. If that is warm, he is alright. If his neck and chest are damp from perspiration, you can take it that he is too warmly dressed or covered. It is more dangerous for the baby to perspire and get chilled afterwards than feel chill from too few clothes.

FEED AND SLEEP

The baby needs fresh air where he sleeps. But do not put him in a very cold room. To keep away a cold, do not hang anything over the cradle for fear of its falling or being pulled down over his face.

It is good to get the baby on a fairly regular feeding time. Then his sleep will also be at the same hour every night. His night time sleep throughout the first year will be about 12 hours.

Your baby for the first few months will not ordinarily be disturbed by ordinary sounds, but when he is several months old he becomes more aware of what is going on around him and takes note of noises. Hence, try to tone down the household noises if you can when he is going to sleep.

There is nothing wrong if an older baby takes from ten minutes to half an hour to go to sleep either at night or at nap time. It is good not to indulge in exciting play before putting him to bed. He needs to be in a calm mood when he goes to bed. That is why mothers sing lullabies. If the father wants to play with the baby, let him do it when he comes home in the evening and not later, and by no means wake him up from sleep just to show him off when your relatives arrive.

WHEN HE CRIES

New parents are sometimes bothered by the young baby breaking their sleep by crying. This is the only way, you must know, that a baby can call attention to his needs. Every time a baby cries, do not imagine all kinds of things to be wrong with him. Probably it is due to a very mild discomfort he is having and not due to hunger or pain, or maybe, he is not just sleepy and wants your company. Again, it may be that he is tired of lying in one position and just wants you to turn him over. Quite likely, he has wetted his bed.

Prolonged or very frequent crying, however, is not good. That keeps the parents worried. At such times do take him up and soothe him. He is likely to cry far less because of his trust in you.

A crying, if it goes for five to ten minutes several times a day, is nothing to be alarmed about. It is only when there is a lot of crying that you need to get the doctor's advice. If you get in the habit of picking up the baby every time he cries, you may do him more harm than good, because a baby quickly learns to take advantage of his mother's uncertainty. Carrying a baby around a good deal or rocking him too much will only make him stay awake. He will get more tired and his demands will increase. Make the bed-going process a pleasant one and not a hurried one. Elderly people are prone to take a baby's crying seriously even though he may cry very little. In such a case the parent has to be firm and not allow the baby to be picked up.

Never give the baby any kind of medicine prescribed by the people to make him sleep. It will always be safe to consult a doctor when such a necessity arises. Give the baby all the comfort he needs at teething time when he is certain to cry in the night. Some parents put the baby to bed with his bottle beside him. This is a bad practice because he will be so dependent on it that he will not be able to go to sleep without it.

THUMB-SUCKING

Some people worry if the baby begins sucking his thumb or finger and often try to stop it. The baby sucks when he is tired or hungry or does not have anything to watch or to do. There is nothing wrong with the sucking he does. Only when thumb-sucking goes on for years that there is any danger of harm to the jaw or teeth; not otherwise.

The baby may sometimes develop a fondness for holding on to the blanket or toy or some other object for which he gets attached to. The habit is harmless and should not be denied to him.

Next time there is a problem, you know what to do.

READERS WRITE

ON GOATS

The article "This Way to Manage your Goat Flocks," (July 1954) impressed me as it would any other man interested in goat-keeping.

—*S.P.B.*

LUCERNE NO. 9

One of your recent issues contained an account of the brilliant performance of 'Lucerne No. 9.' Could you kindly let us know from where its seed is available?

—*H.S., M.S.*

You may please enquire with the Fodder Botanist, Sirsa, Punjab.

CATCH CROPS

Which of the two 'kharif' catch crops, i.e., 'Mung Krishna-11' and 'Urid Ujjain-4,' mentioned in an article (July 1954) will be particularly suitable for growing on my farm in Malwa?

—*I.M.M.*

For you, '*Urid-Ujjain—4*' is specially recommended for double cropping before wheat or gram. Seed of '*Urid-Ujjain—4*' can be obtained from the Superintendent, Central Farm (Kothi), Ujjain.

—*S.M.W.*

SWEET *DALIA*

I have read the article on *dalia* dish (October 1954) with interest. The *dalia* dish described there is presumably a saltish one. For those who nurture a sweet tooth, I can suggest a sweet *dalia* dish. The method of preparing it is almost the same as that for saltish *dalia*, except for a change in the ingredients used. Prepare sweet *dalia* this way.

After properly roasting the *dalia*, add one cup of sugar and four cups of water to it. Cook it well over a medium fire, but don't let it become too thick. Add a few raisins and copra pieces.

Water can be replaced by milk also to make the *dish* more palatable and nutritious. If water is used, the *dalia* should be roasted in a little *ghee.*

Before serving, add one or two tablespoonfuls of *malai* on top.

—*S.S.*

MANURING OF SUGARCANE

What chemical manure, and how much of it, will increase sugarcane-yields substantially? Please advise with special reference to a light soil having an average quantity of organic manure.—N.S.

An experiment lasting for 16 years at the Sugar-Cane Research Station, Shahjahanpur, has shown that nitrogen alone is able to evoke a significant response in the matter of cane-yield. The average increase in yield obtained by applying sulphate of ammonia at the rate of 100 lb. nitrogen per acre is 2.5 md. per pound of nitrogen applied. Neither phosphorus nor potassium has shown any effect on cane-yield, when used alone. They merely improve the action of nitrogen.

A manurial dose consisting of 120 lb. nitrogen per acre, of which 90 lb. is to be given in the form of bulky organics (farmyard manure, farm compost, manurial compost, town compost, press mud, etc.) and/or green manures, about 15 to 20 lb., as light organics (oilcakes or steamed hoof and horn) and 10 to 15 lb. as sulphate of ammonia, is recommended. Superphosphate at the rate of 100 lb. phosphoric acid can be included in the manuring schedule of sugarcane with advantage; it should be applied to the preceding green manure or leguminous crop such as berseem, which incidentally, has given the best results.

The results of soil surveys carried out in the sandy loam, loam and clay loam types of Muzafarnagar district in the Western Range of Uttar Pradesh, are given below:

Sandy loam: When using a high dose of nitrogen (e.g., 120 lb. per acre), it would be more useful to apply it in conjunction with 40 lb. phosphoric acid as superphosphate. In this soil type, an average yield-increase of 2.8 md. of stripped cane per pound of nitrogen applied in the form of sulphate of ammonia, can be expected. The best response is obtained with a lower level of application, viz., 60 lb. nitrogen per acre.

Loam: Nitrogen alone was found to be useful and there was no response to phosphatic fertilizer. An average yield-increase of 1.8 to 2.0 md. of cane per pound of nitrogen applied can be expected in this soil type. The best effect was obtained when sulphate of ammonia was applied directly to the crop at the rate of 60 to 120 lb. nitrogen per acre.

Heavy loam: In this soil type, response to nitrogen was found to be the least and of the order of 0.9 md. of cane per pound of nitrogen applied, only. The best results were obtained when the level of application of nitrogenous fertilizer was high, that is, up to 120 lb. nitrogen per acre. Phosphatic fertilizer was found to be ineffective.

In the recent intensive manurial drive started in Uttar Pradesh, Bihar and the Punjab, a topdressing with sulphate of ammonia to the standing crop of sugarcane, at two maunds and one maund per acre to the irrigated and non-irrigated areas, respectively, has been recommended.

—*I.C.S.C.*

MANUFACTURE OF SAGO

I am interested in the manufacture of sago from tapioca. Could you kindly let me know how it is prepared ?—T.P.

The manufacturing process of sago consists of the following steps: peeling and washing; grading and sieving ; settling and tabling; granulation and formation of sago; gelatinization; drying and polishing; and packing.

Peeling and washing: Tapioca roots are peeled to remove the outer skin and inner rind. The peeled roots are washed in water.

Rasping and sieving: The peeled roots are then fed into a rasper and the rasped material mixed with water and passed over sieves of sufficient fineness (120 to 130 mesh), so as to separate starch from the coarse fibrous material. Complete removal of the fibre is essential for the production of high grade starch.

Settling and tabling of starch: The starch in water is then allowed to settle in settling tanks. The supernatant liquor is drained and the starch that has settled at the bottom again resuspended in fresh water and tabled. The table which is usually made of concreted cement, is about 100 ft. × 20 ft. with channels 12 to 18 in. in width. The fine impurities associated with the starch flow out and the starch (which is usually of a high quality) settles on the table.

Granulation and formation of sago: The starch as obtained from the tables is partially dried till it has a moisture content of 40 to 45 per cent. It is then passed through a granulator where the lumps are broken up into uniform granules. The granules are then transferred to shaking sieves, and shaken for about 20 minutes. Sago globules of various sizes are formed here. They are subsequently passed through the desired mesh (usually 12 per sq. in.) and the bigger ones which do not pass through the mesh are once again granulated and used.

Gelatinization: The globules so made are then transferred to hot aluminium trays coated with a trace of hydrogenated fat and stirred carefully till all the globules are completely gelatinized.

Drying and polishing: The gelatinized sago is then dried in driers at 50 to 55° C in a current of air. It is then passed through a polisher to separate the lumps that form during the earlier processes and to give a bright smooth polish to the grains.

Packing: Sago is then packed in gunny bags. The yield of sago is 22 to 23 per cent of the weight of raw material, i.e., tapioca roots.—*C.F.T.R.I.*

THE EDITOR

INVITES YOUR QUESTIONS & SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

Indian Farming

VOL. IV JANUARY 1955 No.10

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Annas 12 per copy   Rs. 9 for 12 issues   Rs. 4-8 for 6 issues

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THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

Editor's Page

SIMPLE, BUT EFFECTIVE

ON the various Agricultural Research Stations in India work is incessantly going on for evolving a new type of grain or finding out a new measure that can ultimately help solve a problem or boost up crop yields. Immediately the laboratory tests indicate a definite and favourable result, it is put on trial on the field, and results checked and rechecked before finally being sent out as a definite recommendation to farms. The research conducted in recent years covers all aspects of farming and animal husbandry enterprises, and the results accruing directly out of it are of immense value. None of the recommendations made are difficult of adoption for even the farmer with limited means. A majority of them are simple, and involve little expense or inconvenience. Ploughing the land immediately after the main crop is harvested, for example. Those who have followed the recommendations must have seen for themselves how this improves the soil and destroys insect pests taking shelter in the stubble and soil. Treating the seed with inexpensive methods before sowing is another measure that leads to disease-free crops. Growing grasses on field bunds is yet another recommendation that has an appeal. Line sowing of crops, use of simple implements for producing better tilth and burning stubbles of diseased crops are some of the other recommendations that do not involve any heavy preliminary investment. All such recommendations put together make an imposing list of simple 'dos' and 'don'ts' that every farmer, however small he may be, can surely adopt. Practising just one of them may not bring any spectacular rise in crop production, but adopting as many of them as are feasible with the soil, weather and cropping conditions on the farm will definitely change the pattern of farming to a more economic one than it is today.

OUR COVER

These boys may not know it, but they are learning an important lesson—the relationship between soil and water. The problem of soil erosion is so great in farm lands that in many countries of the world, education on soil conservation is included in the school curriculum. A lesson learnt when young creates a lasting impression

Farmers I Have Met

EX-SOLDIER CAPTURES A HILL

PERSONAL supervision coupled with optimism and patience enabled Shri P.V. Sreedharan Moosad of Ponnani taluka in Malabar district of Madras State, to achieve an almost impossible task of converting a vast hilly tract into a useful paddy field. The hilly area, neglected as waste land, measures about 40 acres of which nearly 15 acres have now been reclaimed and brought under paddy cultivation after three years of hard and sustained effort under the direct supervision of Shri Moosad.

Explaining his initial difficulties in developing the tract, Shri Moosad, whom I met a few months ago, said that his main headache was to find out sufficient water to irrigate the area, the nearest source of water supply being half a mile away. Dig wells he could, but hopes of finding water in a hilly tract were little. " However, I decided to dig wells and to my surprise and joy I did find water at a depth of about 25 ft.," said Shri Moosad proudly. When he was assured of a continuous supply of water, he set about levelling the ground, and in 1952 about 10 acres were brought under the plough. During the following year another five acres were reclaimed.

The yield from the newly developed area during 1952 was poor, compared to local standards. But with slight improvement in farming methods better results were obtained during the following two years. Shri Moosad feels confident that before long he would be able to get still better results.

Shri Moosad, 33, is a matriculate of the University of Madras. He took to farming in the year 1950. Prior to his taking up farming as a vocation, Shri Moosad was in the Defence Services having joined the army in the year 1942.

Asked about his plans for the remaining 25 acres, Shri Moosad said that he would like these to be reclaimed, but it was not possible to do so in the immediate future for want of sufficient water supply. He has, therefore, planted mango, jack fruit and cashewnut trees in about 20 acres. The rest has been put under tapioca and sweet potato which are consumed in large quantities by the local people. These crops, he said, fetch good prices. —**K.E.S.**

Man of the Month

love of land converts tough spot into A-1 farm

by

Harkirat Singh

Shri Lajpatrai H. Verma

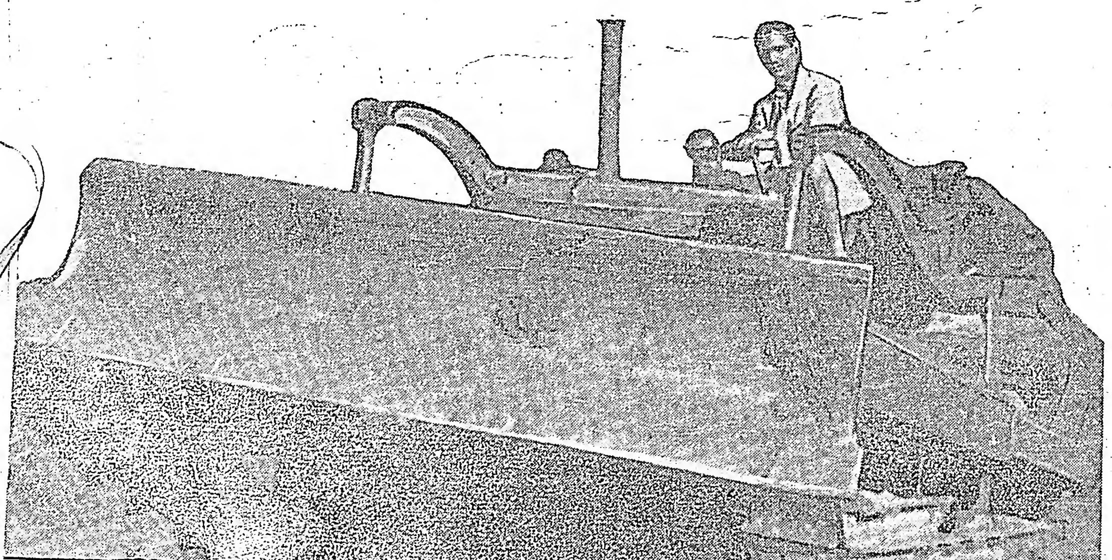
THE other day I was in Pawai, a picturesque jungle land in a Bombay suburb, a scenic beauty, a glorious picnic spot. The land was hard and stony and fit for any venture but farming. But no, I was wrong. Right amidst this stone and grit nestled a farm. Whoever farmed this land, I thought, must have been an extraordinary person to have been able to goad and coax this sort of cruel land to produce crops.

When I met Shri Lajpatrai H. Verma, the man who had done the impossible, and heard the story of the farm, I realized that only Verma could put his hand in such a venture.

Back in 1942 when Verma was in the thick of the non-co-operative movement, this jungle land had provided him with a hideout from the long arm of the law. As he continued to stay there, he developed an attachment to this piece of land, and he determined to stay there even after freedom had dawned.

It is this jungle land that Verma worked on and turned into what is today well known in the area as the Annapoorna Farm. The farm developed just from a scratch, and seeing how serious Verma was bent upon turning it into a smiling piece of green field his friends came forward to help him with the finance needed for his enterprise. Reclamation started in 1947 and by 1951, 250 acres had been cleared of the trees and boulders and turned into a farm. A bulldozer, subsoilers and disc harrows were employed to clear the shrub and prepare the soil for crops.

Even then the soil was far from being fit for a seed-bed. "After clearing the land," said Verma, "It was levelled and clods broken. I was still



It required a bulldozer to clear the wild land

worried about the soil. Then I thought of a novel plan. If the soil provided by nature was not suited for growing crops, then I had got very well to create a soil that could bear the crops."

"And this is how I did it. I brought cattle dung accumulated in the dairies in the suburbs like Andheri and Jogeshwari seven to nine miles from the farm and dumped it on the land. Creating this topsoil cost me well nigh 25,000 rupees by way of transport alone."

The topsoil was reinforced as and when necessary and fertilized with all suitable fertilizers. Cattle urine brought from city dairies was applied in irrigation water and the fields, especially those growing para grass, fertilized with this urine. The irrigation water was pumped out from the Pawai lake nearby. "I know that plant life will exist as long as my rich but artificial topsoil exists. I know that once it disappears, there will be no farm and my business is to see that it does not disappear. This I do by having enough compost and nightsoil manure on the farm itself."

The extent of success that met the efforts of Lajpatrai Verma can be gauged from the fact that in 1953 he was able to supply 1,500 md. of paddy as procurement to the Bombay Government after meeting the needs of the families living on the farm as well as seed requirements.

CROPS RAISED

The farm raises a variety of crops. At the time of my visit, 75 acres were under paddy, 25 under maize and *jowar*, 35 under *tur* and *walpapadi* (*Dolichos lablab*), 25 under Egyptian cotton and 15 under fruits such as banana and papaya and vegetables. In addition, 1,900 mango grafts of choice varieties and 1,600 citrus trees had been planted.

During 1952-53, 10 acres were put under paddy out of which four acres were cultivated by the Japanese method under the guidance of the State Agricultural Department. The paddy crop was a great success and a per-acre yield of 5,300 lb. was obtained; the farm was awarded the first prize at the taluka level. Similarly, the farm also won a prize in the crop competitions held in the *kharif* season of 1953. As a second crop after paddy, wheat and *walpapadi* were sown. A very satisfactory crop of wheat with an average yield of 12 md. per acre (highest yield being 23 md.) was also raised as a second crop after paddy.

Harvested paddy from the new reclaimed land being brought home

The yield of *walpapadi* was nearly doubled by adopting a novel method of harvesting the crop. I was told that in the first crop the pods were hand-picked against the usual practice of pulling out of the crop straightaway. "Surprisingly, the plants began putting forth a second crop of beans," he added. "It was only at that time that the crop was pulled out."

I was then shown a plot where an experimental crop of the improved variety of sugarcane, *Co. 419*, had been planted. I observed that the crop was coming up very well and offered a good prospect for putting a larger area under sugarcane. "If we succeed in this experiment, we hope to take up the manufacture of *khandsari* sugar on the farm," said Verma, encouraged by my appreciative remarks about sugarcane.

AS EMPLOYER

That is not all. Verma is also a sympathetic employer. At present, about 130 workers are employed on the Annapoorna Farm which include labourers, field supervisors, chowkidars, mechanics, drivers for trucks and tractors and a young energetic Secretary, Bhupendar Nath. Verma provides all his workers with free residential accommodation, free firewood and foodgrains grown at the farm at cheap prices. There is a farm dispensary supervised by a private medical practitioner, with one qualified compounder stationed permanently there. Medical attention of all types, including costly injections, is free to the labourers and their families.

The investment of the proprietors of the Annapoorna Farm is in dependable hands. The returns that the farm is now giving have enabled the 10 uprooted families of displaced persons from the West Punjab to lead a reasonably decent life, and have provided an honourable alternate avocation to them. This is a real tribute to the vivid imagination of Verma which has proved to be as good as a practical, well-considered plan.

High yield is only one of the many virtues of this new variety

B-4004 WILL BE A HOT FAVOURITE AMONG SWEET POTATOES

by

V.M. Chavan and M.V. Apte

TRIALS in the field are ahead to watch the performance of a new American variety of sweet potato in Bombay State. The variety, *B-4004*, as it is called, has given a very high performance at a number of Research Stations and School Farms in the State and outbeaten all other varieties of the tuber in yield.

In Bombay, sweet potatoes occupy an area of 28,600 acres, almost half of which is contributed by the districts of Belgaum, South Satara and Sholapur. Bombay's Department of Agriculture has been working on the improvement of the nutritive tuber since 1944.

The Department's early work consisted of collecting a large number of varieties of sweet potatoes from all over the State, and selecting promising varieties for release to farmers. In 1945, three varieties, *C.L.44*, *B-2* and *G.T. 6* were released to farmers. *C.L.44*, a high yielding, red and thick-skinned variety was the best among all, yielding 8,403 lb. per acre as against 6,103 lb. of the local (*Padegaon*) red-skinned variety. *B-2*, a white-skinned and early maturing variety, though not as good in yield as the local, was recommended to farmers because of its early maturity (4½ months) and *G.T. 6*, a red variety, because of its sweet tubers which on cooking give a soft and sweet pulp.

In 1948, Bombay received 14 varieties of the American origin from Dr. Boshi Sen of Almora for finding out their suitability to the soil and climate of the State.

Preliminary trials with these new varieties showed that two out of the 14, *B-4004* and *B-219*, were the most promising ones and as such their performance was compared in subsequent years with those of *C.L.44* and *B-2*.

B-4004 gave an outstanding yield performance. During the two years, it was tried both in the *kharif* and *rabi* seasons. The average yield of this variety was 16,847 lb. to the acre as against 6,670 of *B-219*, 6,625 of *C.L.44* and 6,225 of *B-2*.

This made the Department test this variety immediately in the field at Pimpalgaon in Nasik district. In these trials again, *B-4004* outbeat the rest by producing an average of 27,225 lb. of tubers per acre as against 10,980 of *C.L.44*, 10,817 of *B-219*, 10,527 of the local and 8,530 of *B-2*.

High yield is not the only virtue of *B-4004*. It is early maturing (4½ months), and requires very few or no turnings of the vine during crop growth. Its tubers are located very near the soil surface and hence the harvesting is rendered easy. From the nutritive point also, *B-4004* is superior to *C.L. 44* in all respects, while it is superior to *B-2* in crude proteins and nitrogen.

Studies of this variety have also shown the possibility of increasing its yield further by using annually the top portions of the vines as planting material so that a good stand is available under field conditions.

The tuber scheme under which trials were conducted with these new varieties of sweet potatoes is being partly financed by the Indian Council of Agricultural Research, New Delhi.

FEED YOUR BIRDS RIGHT

by

S.G. Iyer

If there is any reason why our poultry birds remain such poor growers and poor producers of eggs and meat, it can be summed up in one word—malnutrition. Even if you keep improved breeds or cross-breeds, they cannot but perform poorly unless they are fed properly. On the other hand, with proper feeding, even *desi* fowls with poor laying ability can be made to produce better. Hence the watchword on every farm should be proper nutrition.

The foods given to fowls are mainly cereals, cereal by-products of plant or animal origin, minerals and green food. Whatever the feed you give, it should contain water, proteins, carbohydrates, fats, minerals and vitamins, so that there may be balanced nutrition for the birds.

Maize is a good grain for fowls. It is highly digestible, and contains little fibre. It is a starchy (carbohydrate) food, and hence has to be supplemented with a protein-rich food. The yellow variety contains carotene (vitamin A), and is good for egg-production as it influences the colour of the yolk. The white variety can be used for fattening table chickens.

Oats contain oil and minerals as well as iron, and hence a useful feed. Because of the iron, it is suitable for inclusion in rations containing milk products, generally poor in iron. Its high fibre content, however, makes it less valuable than other cereals as a feed.

Barley is a useful grain if fed with caution, as birds fed on barley develop fatty livers. For fattening mashes it is very suitable.

Gram is fairly good, but should be crushed before it is fed. Peas are protein-rich and can replace foods of animal origin.

Wheat is best for poultry. Wheat bran is fairly good, adds bulk to a ration and also provides certain vitamins and minerals.

Paddy is commonly fed to chickens in South India and is good for the birds in the hot weather. *Cheena* is excellent for baby chicks.

Jowar is not a very good cereal for chicks owing to certain toxic principles in it, but may be fed to older birds along with other cereals such as maize, paddy, barley and oats. *Bajra* is a very useful grain akin to wheat in food value and composition. It may be used either as grain or meal in rations for chicks and adults.

Potatoes are a useful carbohydrate food for inclusion in poultry mashes when the cost is low enough. They should be cooked, mashed and then used.

PROTEINS

Extracted soy bean meal is a valuable protein food, nearly as good as milk.

The proteins and minerals contained in milk and its by-products such as curds, buttermilk and skim-milk make them very valuable for growing chicks. Buttermilk contains about the proper amount of lactic acid necessary to induce digestion. It may substitute meat to a great extent.

Meat offal (animal intestines from the slaughter house) is an ideal protein supplement for fowls. It should be cooked, dried off with mash and fed to birds. An adult fowl should get at least one ounce per day in conjunction with a cereal ration containing oilcakes.

Fish meal is a protein-rich food for chickens over six weeks old. It should be low in oil content (three per cent) and light in colour. Its mineral content as well as the protein content (60 per cent) render it a satisfactory supplementary food to cereal grains. If fed up to seven per cent of the ration, there is not much danger of taint in eggs or meat.

Groundnut cake meal is a useful vegetable protein food, particularly if supplemented by minerals. It is valuable for admixture with cereals and cereal by-products. Mustard cake, coconut cake and linseed cake may be used as protein supplements.

Blood meal is a very rich protein food, but being unpalatable, it should not be included to a great extent in the ration.

A desirable supplement for laying stock is bone-meal. Limestone and oyster shell serve as calcium supplements and grit in poultry rations. Common salt is also essential in poultry rations, but should not exceed one per cent of the total ration.

Green food is an absolute must for fowls. Fresh and tender grass, berseem, onions, cabbage, lettuce, lucerne and carrots are excellent. Lack of greens will adversely affect birds and presdispose them to colds and other diseases. If the ration contains no greens, the eggs may get to be inferior in quality. The green food should be cut fine and given uncooked.

FOR CHICKS

A large part of the oil sold for feeding poultry consists of a mixture of two or more oils and an oil concentrate to give it vitamin potency. Fish oils are necessary only when chickens are kept indoors all the time, because of which they do not receive enough of direct sunlight. Shark liver oil is popularly used in poultry rations during summer months when green food is scarce.

For chickens up to eight weeks of age, a grain mixture consisting of equal parts of *cheena* or *bajra* and yellow maize (fine grit), and a mash mixture consisting of wheat bran (35 parts), yellow maize meal (35 parts), ground oats (10 parts), groundnut cake meal (19 parts) and common salt (one part) should be prepared and kept in separate hoppers and made always available to them.

The actual quantities of the mixtures consumed by the chicks will vary with the season, their health condition, breed and environment, but roughly, the following will be the quantities required per 100 chicks per week:

Age in weeks	*Quantity of mixtures in pounds*
1st	10
2nd	20
3rd	30
4th	40
5th	50
6th	60
7th	70
8th	80

To provide animal protein supplement to the chicks, fish meal should be given mixed with mash at seven to ten parts to 100 parts of the mixture.

Instead of fish meal, skim-milk (in double the quantity of the mixtures) or meat offal in the ratio of 25 parts to 100 parts of the mixtures can also be given. Skim-milk, however, is the best animal protein supplement for chicks.

Small marble chips, containing not less than 35 per cent of calcium carbonate if made available to the chicks will supply the calcium needed by them.

Finely chopped fresh and succulent greens like berseem, lucerne, cabbage leaves, cauliflower leaves or *dub* grass should be supplied to chicks as much as they can feed on from the seventh day onwards.

FOR ADULT FOWLS

For adult fowls, one or more of grains like yellow maize grit, barley, oats, *jowar* and bajra mixed in equal proportions, may be fed as scratch grain at about two ounces per bird per day. In addition, a mash mixture, containing wheat bran (35 parts), yellow maize meal (35 parts), ground oats (10 parts,) groundnut cake meal (19 parts) and common salt (one part) should be prepared and kept readily available to the birds. This should be fed at about two ounces per adult bird or according to what they actually can consume.

If so desired, birds may be fed only on the mash mixture, and the grains may be excluded from the feed. In such a case, the composition of the mash should be made up of maize (42 parts), wheat bran (45 parts), powdered limestone (three parts) and fish meal (10 parts). This may be fed at about four ounces per bird per day or the quantity they actually can consume.

By way of animal protein supplement, fish meal at 5 to 10 parts to 100 parts of the above mixture, or skim-milk or buttermilk at four ounces per bird per day or according to actual consumption, or meat offal at 1 to 1½ ounces per bird per day, should be given.

Skim-milk or buttermilk may be given as such or mixed with half the mash mixture, in which case it should have to be consumed quick so that it may not get putrified.

Meat offal cooked and minced, should be mixed with half the above mash mixture, and the mixture consumed as soon as given to the birds. Fish meal should be mixed with the mash dry.

Unburnt limestone containing not less than 35 per cent of calcium cerbonate and broken into pieces about the size of a gram should be kept always available to the birds as a calcium supplement.

Well chopped fresh and succulent greens like green berseem, lucerne, green *dub* grass, cauliflower or cabbage leaves should be fed as much as the birds can consume. The consumption will be about one or two ounces per bird per day.

In preparing feed mixtures, oats may be substituted by barley and maize, by *bajra, jowar* or barley, wheat bran, by barley bran or gram *chuni*.

OTHER FEEDS

Other feeds that can profitably be utilised for feeding poultry are fallen grains, processed cowdung, worms and insects, white ants, mango seed kernel, *jaman* seed, *mahua* and the like.

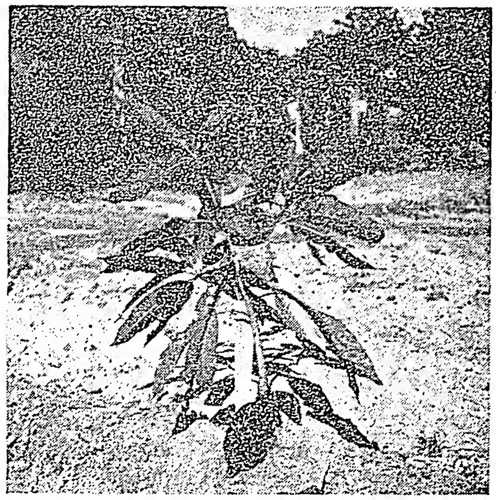
Water should be available for the birds at all times of the day and should be kept in shade.

As much of the balanced mash should be given to the chicks as they can consume from the first day onwards in suitably designed hoppers. The grain can be fed several times a day during the first week, but thereafter it should only be fed in the morning and evening according to the birds' appetite. Liberal amounts of cut fresh green food and broken limestone in enough quantities should be fed at all stages.

From the date of hatching to six weeks, only separated milk should be given for drinking but no water, and from six weeks onwards, separated milk and water in separate containers should be fed.

Laying stock can receive the same rations as growing chicks. If separated milk is scarce or expensive, good quality buttermilk can be given. Where milk products are not available meat offal may be given. The meat should be cut up fine or run through a mincing machine and cooked for a period of one hour before use. One pound of meat offal to every three pounds of mash and grains may be fed. With adult hens, good results can be obtained by feeding the usual mash and grain rations along with one ounce of meat offal per bird per day.

Rooted grafts in pots



Severed root grafts

I tried this way of
AIR LAYERING OF MANGO

by
M. L. GARG

I HAVE been trying a cheap method of Marcotting or air layering of mangoes with good success, which I thought, would interest others. This is how it is done.

Early in July, select about two-year old shoots with ripe wood, and having some well-developed and healthy leaves. Make a complete ring of bark about an inch in width, removing the bark completely from the wood. The girdled or ringed part is then covered with a ball of compost (leaf mould) and sand, in the proportion of 2:1, which is wrapped in moist moss and then finally covered with a piece of Alkathene film of about 8 in. × 10 in. or such other film. Securely tie both the ends of the film and also tie one band over the middle of the packed portion so as to completely seal it against air, sun and rain water.

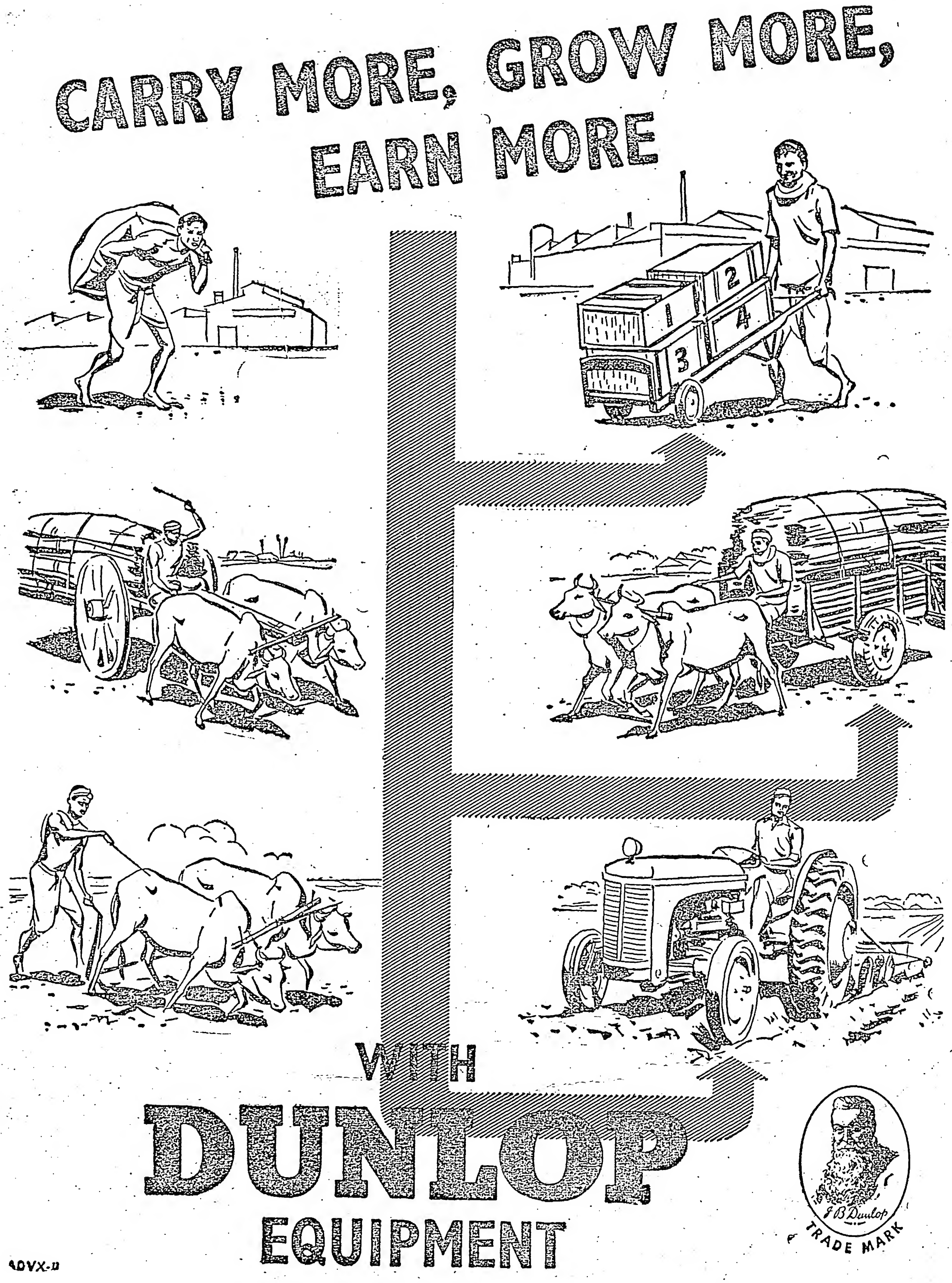
Leave it as it is for a period of about two months and then thoroughly examine the covered portion for dark brown roots. If such roots are visible, give three cuts, near the base of the girdle, at intervals of ten days and sever the grafts from the mother trees with the third or last cut. Plant the detached grafts in pots and keep them in a shady and cool place. Watering should be given as and when required.

These are the grafts on their own roots, which, after a month or so, become quite fit for transplanting in their permanent places.

This is the cheapest method of air layering I know of. But I have tried it only on *Dasheri* and *Langra Banarsi* varieties of mango. The result with *Dasheri* is excellent, but with *Langra Banarsi* the success is only 40 per cent.

I used no hormones or any other root-stimulating substances. The cost of propagation of mango grafts by this method is only about Rs. 0-3-9 per graft, as detailed below:

	Rs.a.p.
Leaf mould and sand	0-0-9
Cost of Alkathene film and string	0-1-0
Labour for grafting	0-2-0
Total	0-3-9


CARRY MORE, GROW MORE,
EARN MORE
1
2
3
4
WITH
DUNLOP
EQUIPMENT
J B Dunlop
TRADE MARK
ADVX-II

The demand for preserves is consistently good now. Indications show it is going to be better

PROSPECTS BRIGHTER FOR FRUIT AND VEGETABLE PRESERVES

by

P.H. Bhatt

NOT very many people know it, but the industry of preserving fruits and vegetables in our country is going ahead. From 11,741 tons of various types of preserved products manufactured in 1952, the rise has been a steep one to 14,216 tons in 1953.

Of the various fruit and vegetable products manufactured can be listed juices, squashes, cordials, barley waters, fruit beverages, syrups, crystallised fruits, preserves, chutneys, pickles, vinegar, tomato products, jams, jellies, marmalades, canned fruits and vegetables and carbonated fruit beverages.

One important aspect of the fruit and vegetable preservation industry in our country is that the production of the majority of the items though concentrated in urban areas, particularly in Bombay, Calcutta, Delhi and Amritsar, yet the manufacturers operate on a cottage or small scale basis. Of the 638 units in the country only 57 have an annual production of over 50,000 rupees. Hence it is essentially a cottage scale industry and any future development of the industry will have to be linked up with the small producers.

The preservation industry has to be developed and this can be done fully only when the quality of the products is standardized. The Fruit Products Order promulgated under the Essential Supplies (Temporary Powers) Act, 1946, lays down the standards of the quality of the fruit products and the raw materials, standards of hygienic and sanitary conditions of manufacturing premises and workers, standards of marketing and labelling of products and compulsory licensing for the manufacture of these products.

It is these standards that protect the interests of both the manufacturer and the consumer. Legislation makes it possible that the fruits are well preserved and prevents adulteration as also prevents harmful substances being included in the products.

There is a growing demand for squashes and beverages, and the industry is already pretty well developed, but in the South where raw materials like oranges, pineapples and mangoes are easily available, there are good chances of further development. The only handicaps met with are the high cost of sugar and of packing material, particularly bottles.

Fruit beverages can easily be manufactured from simple recipes and by adding preservatives like sodium benzoate and/or sulphur dioxide. Good chances exist for manufacturing these products on a cottage scale.

Making pickles, of course, is known in every home. Pickles manufacture is a small scale industry too all over India and the products vary in taste with the different combinations of fruits, vegetables, salt and a variety of oils used. But it must be said that a lot more effort has to go into this industry to make the process more hygienic and sanitary.

PRESERVES

Manufacture of preserves is found mainly in the North, the important centres being Delhi, Amritsar, Banaras, Agra, Lucknow and other towns. The main products are apple, *àmla*, *harad*, carrots, *bel*, mangoes and *petha*. Some of these preserves are also used for medicinal purposes. Making preserves is as ancient as the hills and has been particularly helped due to its importance recognised by the Unani System of medicine. What is required in this industry is an approach to modern methods of manufacture and packing.

Indian chutneys, especially those from raw mangoes, are popular abroad, especially in the United Kingdom and the Continent. The industry is mostly concentrated in Bombay and Calcutta. The raw material used comes from the mango-producing centres where raw mangoes are peeled and brined on a cottage scale. The mango slices are pickled before the chutney is manufactured.

There is a fairly consistent demand for jams, jellies and marmalades. A large number of small manufacturers have learnt processing and marketing fairly huge quantities of these products, but imported goods compete with these products. Indian manufacturers have not only got to improve the quality of their products, but also keep up a consistency in standards. The industry has a bright future because of the varieties of indigenous fruits available from which excellent jams and jellies can be manufactured.

CANNING

Canned fruits and vegetables mostly go to the Defence Services, but if canned fruits, juices and pulp can be made available at cheaper prices these are sure to get popular. Jams, jellies and marmalades as well as canned fruits are protected under the tariff.

Canning of pineapple, orange and mango as well as some deciduous fruits has been making good progress and some of these are being exported also. This industry has a future, especially in the fruit-growing regions.

(Continued on page 15)

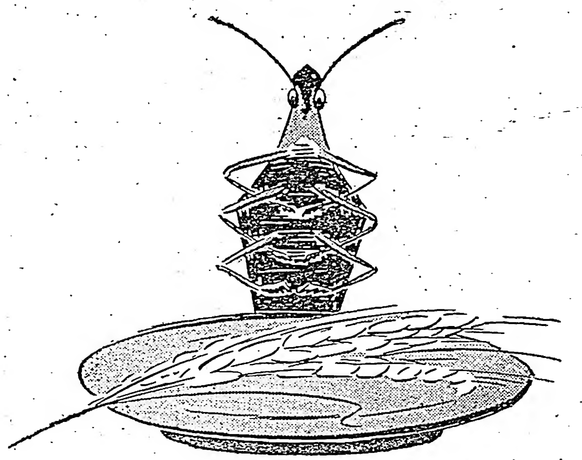
WHAT'S NEW IN FARMING

FIGHTING RICE BUGS

DUSTING five per cent BHC or five per cent DDT on the rice crop has been found to be an effective way of killing the common rice bug (*Gundhi* bug or stink bug). Recent experiments have shown that the insect pest is brought under control in 24 hours of dusting the insecticide.

The rice bug is a common pest in India as in many other rice-growing countries. Though it is considered a minor pest of rice, in some years it assumes an epidemic form and causes considerable loss to the rice crop. In 1952, for example, the bug appeared as a serious pest in Madhya Pradesh, Uttar Pradesh, Vindhya Pradesh, Bihar and Orissa over a total area of nearly 76 lakh acres.

The insect punctures grain in the milk stage, sucks the content and renders it chaffy. If the grain develops in spite of this, it never gets completely filled.



BETTER SUGARCANE

RESULTS of research being conducted on sugarcane in Uttar Pradesh for the last two to three years are of great interest to cane growers in general and those in the State in particular. Research has gone to show that trench planting is better than flat planting from the point of view of yield of both the plant cane as well as the ratoon.

Among the new varieties of cane tried *Co. S. 510* has proved to be the best performer, giving about 47 per cent higher tonnage and 54 per cent more sugar per acre. It is less susceptible to borers and is more resistant to red rot than *Co. 421*. *Co. S. 469* is another outstanding cane with a yield of 890 md. of cane or 111·5 md. of sugar per acre.

So far as rotation is concerned, sugarcane gave better yields and more sugar per acre when *senai* was included for green manuring in the rotations.

Incorporation of cane trash directly in the soil at 75 md. per acre during July with 100 lb. of phosphatic acid and 10 lb. of magnesium sulphate per acre applied 1¼ months before cane planting, gave better results under autumn planting conditions than when trash was not used.

Harvesting of plant cane from mid-February to mid-April appeared to be the best for keeping ratoons in general. The higher yields of ratoons were obtained with trench plant cane harvested at ground level and that manured with 120 lb. of nitrogen per acre, applied half at harvest of plant cane and half at the break of rains.

WASHING WOOL

THAT washing of sheep before shearing and properly grading the wool can bring extra money to shepherds was shown recently in Ajmer under a scheme worked by the Indian Council of Agricultural Research.

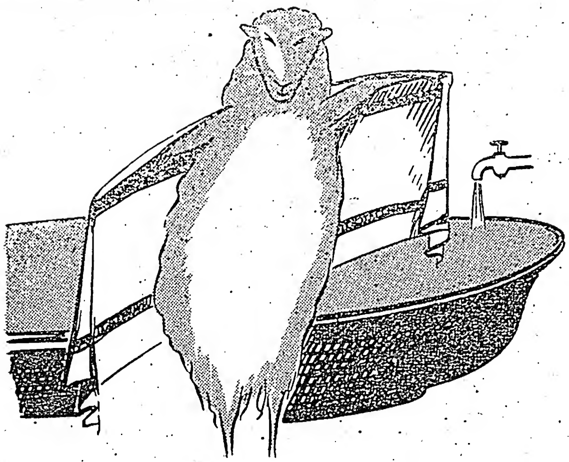
Most of the wool in the market is at present sold unwashed because of the reluctance of shepherds to wash sheep before shearing as in most cases they do not find it economical.

In the area where the scheme was tried, the indigenous shearing instrument known as *katha* was replaced by the improved scissors for shearing. The improved instrument was found not only very economical but also the shearing made uniform and speedy. The length of the wool threads was also maintained. With the scissors it was possible for the shepherds to work on the lower portions of the body efficiently, and without causing any cuts or injuries or discomfort for the sheep.

In washing the sheep, only clean water tanks were utilized and the flock owners were advised to use hard ground for keeping the sheep on till their bodies were dry.

After shearing, the wool was graded into white and coloured wools and after the sorting was over the produce was marketed at the nearest wool market and the flock owners taken to the open auction.

It was found that the washed and graded wool fetched Rs. 20 to 30 more per bale than the usual wool.



sides. The vents are placed at an angle of 45°, the height of which being roughly 1/3rd of the total length of the tripod.

Grass is cut and dried in the sun for a while and after necessary aeration, placed over the frame in such a way that when the stack is complete it looks somewhat like a pyramid, the interior of which is hollow.

This worked out to a profit of Rs. 0-1-9 per sheep.

HAY MAKING

WHEREVER the climate is hot and humid as in Assam and parts of Bihar, natural grasses grow well but hay making is difficult. For those who experience this difficulty, here is a new method of hay making which solves the problem to a great extent. It is called the tripod system of hay making.

Three poles are fixed in an inclined position so that they meet the surface of the earth forming an equilateral triangle. The free ends of the poles are tied together so as to form a cone. In between two poles, a sort of vent is constructed on the ground which allows the air to pass right through the centre up to the other extremity of the tripod when the stack is complete. Three such vents are required to fill up the empty space of the tripod. The poles of the tripod are then tied up at convenient points by means of strings, which gives the appearance of a triangle round the poles. In practice, the vent may be constructed with galvanised corrugated iron sheets over a wooden frame which is adjustable. The shape of the vent when placed in position looks like the roof of a house made of galvanised iron sheets having a slope on both

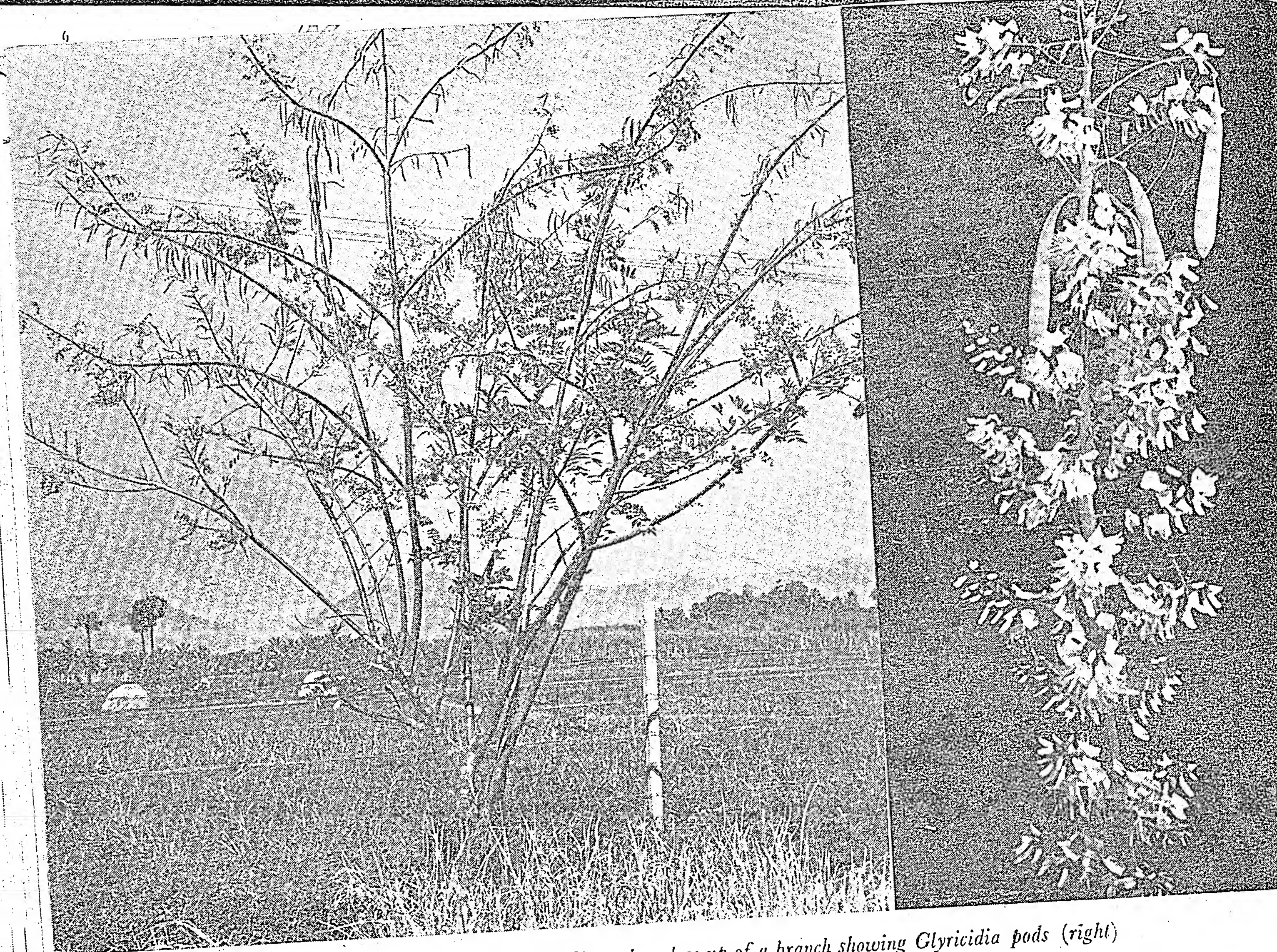
Such half dried grass when stacked in the frame continues to lose moisture without showing signs of decomposition till a product containing about 80 per cent dry matter is obtained.

In such a structure about 100 maunds of semidried grass can be stored which would usually be sufficient for four bullocks and a cow for about four months from December onwards. It is possible to stack eight to ten maunds of semidried grass per day.

This system was made possible because of a scheme sponsored by the Indian Council of Agricultural Research in Assam.

(*Contd. from page 13*)

In very many countries of the world the fruit preservation industry is linked up with horticultural development. Here too it has got to be an extension of horticultural development. Though the prices of perishables in consuming centres are pretty good, there are periods of gluts in the producing areas where the real return to the producer may be very meagre. Apart from more people taking up the preserving industry the man in the street must also come to realize the nutritional value of such products so that he may use them as protective foods.



Glyricidia growing on a field bund (left) and a close up of a branch showing Glyricidia pods (right)

GLYRICIDIA can slash off your ma

A NUMBER of farmers in Madras State are saving a hundred rupees or more an acre in their manure bills these days by growing *Glyricidia* on their field bunds.

Glyricidia has become so popular that a campaign for growing the plant along field channels and pathways started by the State Agricultural Department in 1947 has had a tremendous response. Most villages grow *Glyricidia* now, and it is spreading to more at a very fast rate.

Sesbania is another popular green manure for the rice plant, and is particularly useful in all acres where the field bunds are small. But it has the disadvantage of being an annual. That means it has to be grown every year. Not so *Glyricidia*. It is a perennial and quick-growing shrub in addition. Where the bunds are 12 to 15 in. broad, it is possible to grow *Glyricidia* along with *Sesbania* on the bunds.

Raised six feet apart on half the total length of bunds of double crop lands at the Paddy Breeding

Station, Coimbatore, *Glyricidia* produced 4,000 lb. of leaves to an acre in two years of growth. The bunds here are 15 in. broad and 12 in. high.

No adverse root or shade effect was noticed from the plants grown. A study of the root system showed that the roots penetrated deep into the soil, leaving the shallow paddy plants quite unaffected.

Glyricidia is a legume. It fixes nitrogen from the air and does not deplete the soil of it. It offers more or less a permanent solution to the problem of finding green manure for the rice crop. It is a green manure on the spot.

A paddy field divided into 10-cent plots has over 500 yards of bunds an acre. Even allowing some space for walking on the bunds, there will be enough of the length of the bunds left for producing the leaf requirements of the acre.

RAISING GLYRICIDIA

It will not be a difficult matter for any farmer to raise *Glyricidia* seedlings and transplant about a hundred plants on the bunds at the time of transplanting paddy from July to September.

About a week prior to the transplantation of the *Glyricidia* seedlings, pits of about a span or more in diameter may be dug every six feet, and filled with well-decomposed farmyard manure and any light soil like sand or sandy loam. The pits are then watered well so that the soil may settle down.

Two to three week old seedlings are transplanted in each pit after loosening the soil. The pit is watered after planting. Care should be taken in lifting the seedlings from the seed-bed, and seeing that each seedling is lifted with a ball of earth.

Transplanted seedlings will not require watering for about four days, and further watering can be done according to weather and plant conditions.

The plant is fast growing, and by the time rice is harvested, will grow beyond the reach of goats and cattle. The branches may be lopped a year after plants have established themselves, and thereafter whenever needed.

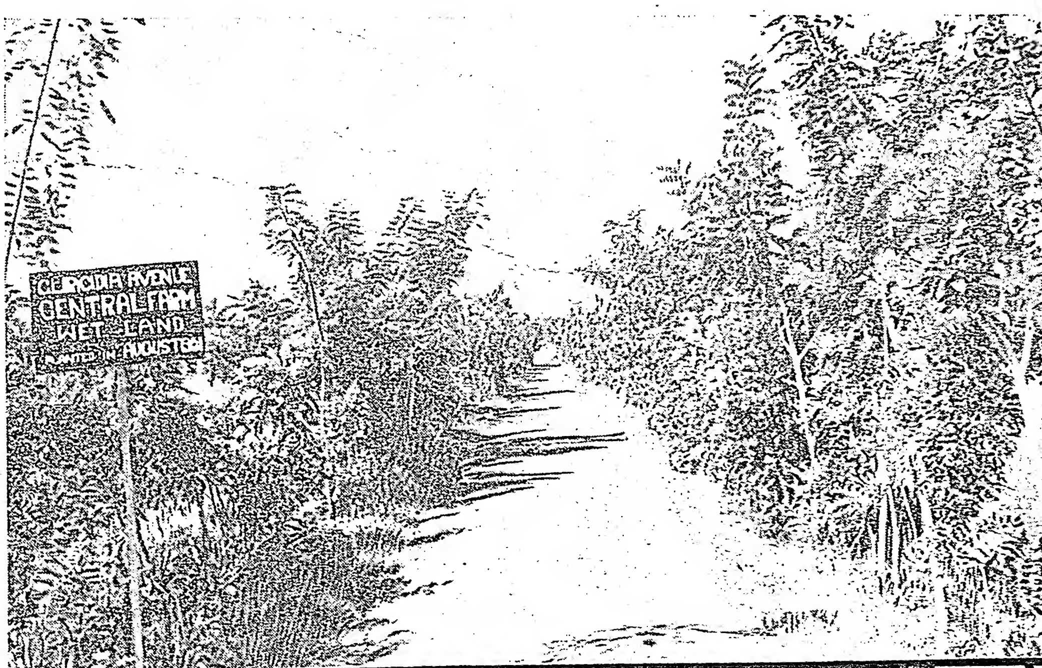
A single plant of *Glyricidia* planted along an irrigation channel produced over 300 lb. of leaves from the third year onwards at the Paddy Research Station at Aduthurai. Taking 6,000 to be the number of seeds in a pound of *Glyricidia* and that 75 per cent of them will germinate, almost 300 acres can be green manured from the third year onwards from the seedlings raised from a pound of seed, if sufficient care is taken to raise them on suitable bunds.

Glyricidia can stand frequent lopping. Where double cropping of rice is practised, the short interval between the harvest of the second crop and transplantation of the first does not permit of raising a green manure, and it is here that *Glyricidia* becomes all the more useful. On single crop wet lands it will enable the farmer to utilize the land for raising a crop of cotton or groundnut in the off-season if he has a small well, or a pulse crop, if irrigation is possible.

In Coimbatore, where extensive studies with *Glyricidia* have been conducted, the plant has been found thriving in spite of the 20 in. of rainfall. Farm experts say that *Glyricidia* can thrive almost all over the country and help farmers cut their manure budgets.

budget

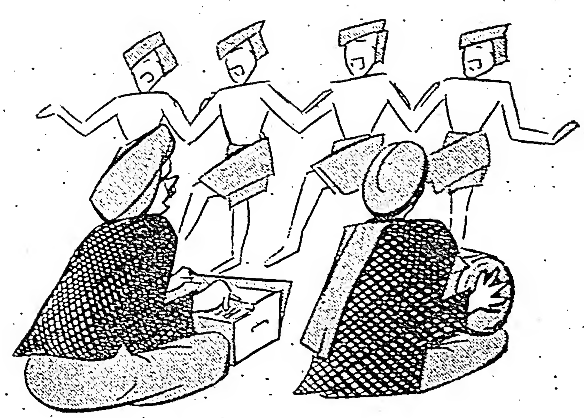
An inexpensive way of growing manure right where you want it



A Glyricidia avenue at Coimbatore

One way of education through entertainment

SONG AND DRAMA CAN KEEP MEETINGS LIVELY



SO that your meetings may not become a monotonous affair stuffed with serious discussion, it is good to have an occasional spell of song or even drama inbetween the proceedings. The villager has a great fascination for folk-songs, dance and drama, and though the art is in many places dying out because of lack of interest, the village worker will still find them good for conveying information on better ways of living.

In every village, there will be someone who can enliven the proceedings of your meeting with a good folk song. Generally, the singer is also the song writer, and his songs are in the form of a story with a moral. The village worker can get such persons to compose songs on subjects which he wants to popularise. These songs can be written to the popular tunes which the villager often hears, for then he is sure to pick up the words without the need for any printed literature.

A song is best successful if it revolves round one single idea. A few words by way of explanation before the song and a follow-up explanation of its theme at the end will make it more effective.

Usually, villagers like to listen to seasoned singers, but they also welcome new voices. So the village worker can also spot and encourage new talent. This in fact is another way in which the village worker can make use of the song. He can organise local competitions for the best song on one subject. The final test can be made an occasion by announcing to the villagers the location and time of judging the best entry, so that they all come to hear the messages you wish to convey.

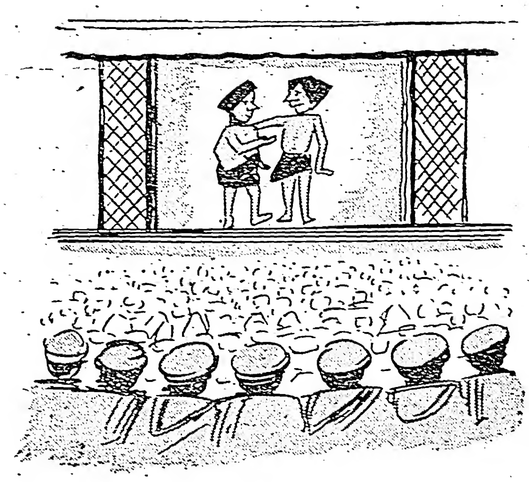
On certain occasions you may not find the compositions in a particular village good, and even the best song not good enough. It should not however go without being declared as the best, and under no circumstances should the song writer go unrewarded. This will give further encouragement to the song writers and singers to compose and sing on their own.

THE DRAMA

The drama is a source of both entertainment as well as education. Because of the entertainment that it provides, you can get people together and use the occasion to talk to them about the village programmes that you have in mind.

However, dramas are not so common as the song in the village. But given appropriate publicity, a drama will be well attended by the villagers, even from neighbouring villages.

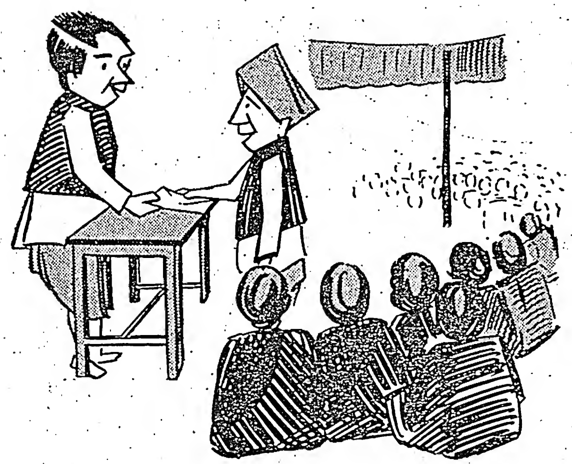
Many practical difficulties may however crop up when it actually comes to putting up a dramatic performance. The first and foremost would be as to



who should write the script and compose the songs. This is an art which everybody does not know. It may be possible to get copies of popular one-act plays in the local language which will suit the local needs.

New dramas on some aspect of improved farming or living can also be written out, and the village school-master can be of immense help to you in this respect. He is often good in this art and is generally the person who puts up dramatic performances on special days. He can also be of assistance in training the actors as well as providing the necessary materials for the stage. In case you have no such help do the work yourself.

At times, you will not find it possible to get together the artists from one single village. In that case, they can be picked from different villages. Many literate villagers can also be trained in this art, and



this is rather good, for the villagers find additional amusement when they see familiar faces on the stage. First select villagers who are inclined to acting. This can be done by having them read or repeat a passage. You will find that a number of them have an appealing voice.

It is not necessary that you should have a well built stage. Any well located open space with a little raised ground or platform will do. A single piece of cloth will serve as a curtain. The time for the drama should suit the convenience of the villagers, so that all of them can come. It is best to stage the dramas on nights when there is moonlight, so the villagers may go back home in the light. If the drama is good, the village worker will find big crowds attending the show.

A word of caution however is needed here. The talks during the show should not be too long. The villagers may feel tricked and clamour for the continuation of the show. It will be a good idea to say a few words before the curtain goes up about the purpose of the drama. At the end of the show, express appreciation for the principal people who are taking part and others who have helped.—*From the forthcoming publication "Extension Guide for the Village Worker"*

What Farmers Say

SELECTING A BULLOCK

छोटा मुंह और ऐंठा कान ।
यही वैल की है पहचान ।।

A small face and twisted ears are the signs of a good bullock.

हिरन मुतान औ पतली पूंछ ।
वैल वेसाहो कंत वेपूंछ ।।

The bullock which has a stiff sheath sticking to the abdomen and a long tapering tail should be purchased without any consultation.

पूंछ झम्पा औ छोटे कान ।
ऐसें वरद मेहनती जान ।।

A bullock possessing a tufted tail and short ears can be taken to be very hardy.

पतली पेंडुली मोटी रान
पूंछ होय भुइँ तरियान ।
जाके होवै ऐसी गोई,
वाको तकैं और सव कोई ।।

The farmer who possesses bullocks having thin calf muscles and well developed thigh muscles, a long tail that reaches the ground will get everyone's admiration.

सींग मुड़े माथा उठा, मुंह का होवे गोल ।
रोम नरम चंचल करन, तेज वैल अनमोल ।।

A bullock having curled horns, raised forehead, roundish face, soft hair all over the body and alert ears will plough the fields speedily and will be invaluable.

भैंसा वरद की खेती करै,
करजा काढ़ विरानो खाय ।
वधिया ऐंचत है यहरी को,
भैंसा ओहरी को लै जाय ।।

Putting a buffalo bull along with a bullock to a plough is as bad as wasting money that was borrowed. The two would never work together. The bullock would go one way, the buffalo the other. (In strong sun the buffalo bull would try to run away towards shade. In *Aasarh-Sawan* (July-August) it would move towards fields full of water when the bullock would like to be on dry land.—**P.L.J.**

Those who fancy bottle gourds will surely like to try this new variety

'Summer Prolific' is a heavy yielder

by

H.B. SINGH and S.M. SIKKA

THE Indian Agricultural Research Institute, New Delhi, has a new variety of bottle gourd to offer to farmers.

This variety, christened *Pusa Summer Prolific*, bears a heavy crop of well-sized fruits, each plant putting forth as many as 10 to 15 fruits, each measuring 16 to 20 in. in length and 8 to 10 in. in girth when young and tender. When fully mature, the fruits grow up to 30 in. in length. On an average the produce per plant weighs from 10 to 15 sr.

Recently selected from local material, the new variety is particularly suited for growing as a summer crop, though it is suitable for growing in the rainy season too.

Gourds are an important group of tropical and sub-tropical vegetables, and bottle gourd (*lauki, ghiya*) is a very popular summer vegetable grown almost in every state of India. In fact, this vegetable heralds the beginning of the spring season and becomes available at a time when most winter vegetables are about to be out of the market. The young and tender fruits of this gourd are used not only for cooking, but also for the preparation of sweets.

Bottle gourd requires a warm growing season and does not withstand frost. In frost-free areas, it can grow almost all the year round. There are two main planting seasons: for the spring-summer crop which becomes available from the beginning of March, the sowing is done from the middle of October to the middle of March, whereas for the rainy season and autumn supplies, the sowing is done during June and July. In the hills, the crop can be sown during April and May. The October-planted crop is the earliest to produce fruits, but the plants have to be protected from cold to avoid being damaged.

PREPARATION OF LAND

Pusa Summer Prolific will grow in any good soil, though it prefers a heavily manured friable land.

Like all gourds, this variety has an extensive but shallow root system, and as such it is advisable to prepare and manure the whole field rather than dig trenches only at the places where the seed is to be planted and apply farmyard manure in individual pits, as is usually done by vegetable growers.

Three to four ploughings should be given to mix up the manure and bring the field to the desired tilth. At least 20 cartloads of farmyard manure should be applied to an acre of land. For better yields, a mixture of 100 lb. ammonium sulphate, 250 lb. superphosphate and 80 lb. sulphate of potash should also be applied at the time of preparing the land. When the field is well prepared, raised beds, six to eight feet wide with two feet wide furrows between them for irrigation, should be marked out.

SOWING METHODS

There are at least three different methods of sowing the crop. According to the first method, the seeds are first sown in the nursery and the young plants with two to three leaves transplanted in the main field. If this method is followed, care should be taken to see that least injury is caused to the roots of young plants during transplanting. To be able to do this, the seedlings should be lifted with a ball of earth. This method is preferable when the sowing is done during the cold season for producing an early crop.

For raising a good nursery, germination has to be initiated in the seeds before they are actually sown.

For this purpose, the seeds are soaked in warm water for about 24 hours. The soaked seeds are then kept in the innermost layer of a wrapped thick cloth wetted with hot water and placed in the kitchen near the fireplace. Warm water is then sprinkled over this cloth morning and evening for about three days, after which period the seeds begin to sprout. The sprouting of the seeds is generally completed within a period of five to six days and they then become fit for planting in the nursery. While sowing the seeds in the nursery, care should be taken to place them in the soil in such a way that their narrow and sprouted ends face downwards. The nursery can be raised in the open, or in wooden or earthen containers. In the former case, the bed should be covered close to the ground during the night. The containers can however be shifted to the rooms during the night.

The sprouted seeds can also be sown directly in the field. In that case, however, unless the season has warmed up, the hills in which sprouted seeds are sown will require to be protected from cold by placing a *sarkanda* thatch over their north-western side. It is advisable to sow four to six seeds per hill to secure a uniform stand of the crop, but ultimately only one or two plants per hill should be kept. At this rate, about two seers of seed would be required to sow an area of one acre. In the transplanting method, however, a lesser quantity of seed would be required, as seedlings can be carefully planted and established in each hill.

If a pre-winter sowing in October is to be done, the seeds can be sown directly in the field. The temperature being fairly high at that time, the seeds germinate easily and produce sufficient growth before the temperature falls so low as to retard the growth of the young plants. During the cooler months that follow, these plants should be protected with a *sarkanda* thatch which should be removed as soon as the weather begins to warm up in the month of February.

For raising the rainy season crop, sowing can also be carried out directly in the field in the months of June and July, by putting three to four seeds per hill. In that case, no pre-sowing germination of the seeds would be necessary.

The transplanting or sowing of the seeds should be done on both the sides of the raised beds, keeping a distance of six feet between the plants in the rainy season crop and four feet in the crop sown in the cold weather. The rainy season crop should be provided with supports if possible. No staking is, however, necessary for the hot weather crop.

Full grown 'Summer Prolific' can be as attractive as these

AFTER-CARE

The summer crop requires irrigation every third or fourth day. The number of irrigations required for the rainy season crop would be determined by the number of rainy days. The beds should be kept free of weeds, especially in the early stages. Later on, the rapidly spreading vines themselves are able to smother the weeds. Frequent hoeing and interculturing of the young plants are also desirable.

HARVESTING

The October-sown crop starts fruiting about the middle of March, and still earlier at places where the winter is comparatively mild. The January-February sown crop starts bearing fruits about the middle of April. The fruiting season of the summer crop lasts up to the end of July while that of the rainy season crop continues up to the end of November. This variety generally produces three to four flushes of flowers during the season.

PESTS AND DISEASES

The most common and troublesome insect pests of bottle gourd are the red pumpkin beetle and the fruit fly. The former eats away the first leaves produced by the plants as also the true leaves and the stem. The grubs of this beetle also bore into the young fruits touching the ground. The fruit fly of which there are two distinct kinds, damages the young developing fruits.

The beetle can be controlled by periodically dusting the plants in the mornings with 'Paris green' and ashes in the proportion of 1 : 8 or with lead arsenate in the proportion of 1 : 30. Simply dusting with wood or cowdung ash also helps. Hand-picking of insects early in the morning when they are inactive, greatly helps in checking the spread of this pest ; this is possible at least in small plots and kitchen gardens. The fruit flies are attracted by the smell of citronella oil. About ten drops of this oil added to water contained in a small shallow container will be a good trap for the flies. The flies thus collected may be destroyed by burning them. The infested fruits should be collected and buried deep into the ground.

CHEMICAL CONTROL OF WEEDS

by

RAM GOPAL

WEEDS are of great agricultural significance in that they interfere with the production of crops and add to the cost of cultivation. Of the various methods of fighting the weed menace, viz., mechanical, biological, and chemical, the chemical approach has, of late, been assuming increasing importance especially after the discovery of hormonal herbicides. All weeds, however, cannot at present be controlled by these substances. Therefore, a list of those weeds, most commonly found in India, and which can be controlled with these chemicals, has been drawn up. This information has been compiled from a list given in *Plants and Gardens*, vol. 8, No. 1, 1952, of the Brooklyn Institute of Arts and Sciences, New York, and from the data reported by the following workers in India: Kumar, L.S.S. Solomon, S. and Rao, V.V. Proceedings, Indian Academy of Sciences (1949), 243; Kumar, L.S.S. and Solomon, S., *Poona Agricultural College Magazine*, (1952), 43, 61; Mehta, P.R. and Gupta, S.L., *Agriculture and Animal Husbandry*, Uttar Pardesh, (1951) 2 (3), 268; Thomas, K.M. and Srinivasan, A.R.—'Weed Killers', *Indian Farming* (1949), 10 (3); Venkataratnam, L.—'Herbicides and their scope in South India', *Madras Agricultural Journal* (1950), 37, 400.

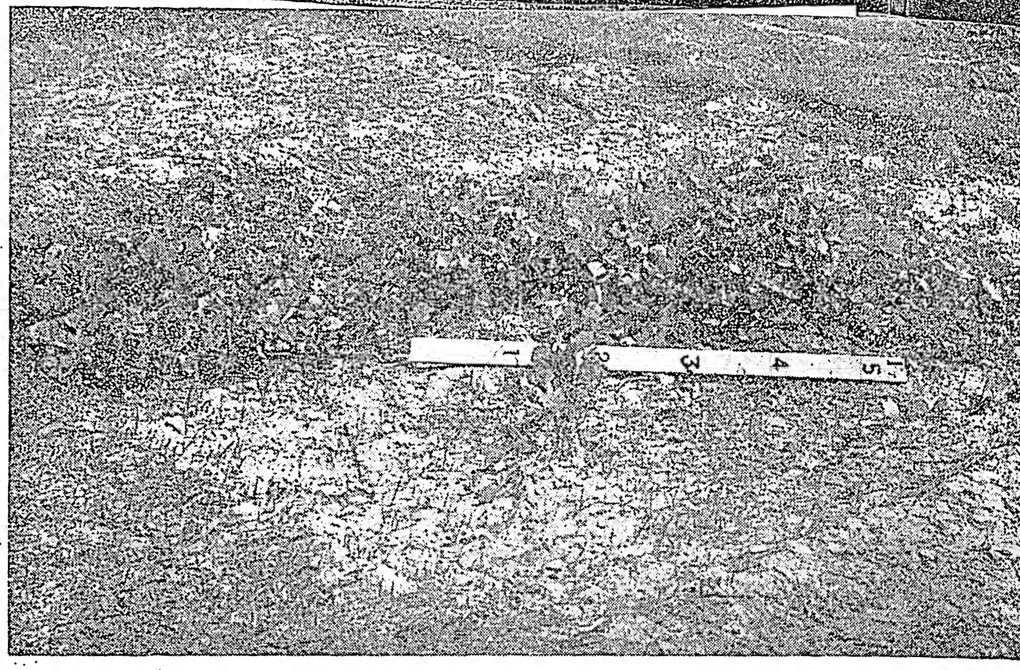
Scientific name	Common name	Vernacular name	Compound	Remarks	Dosage
Ageratum conyzoides	Bill goat weed	..	2, 4-D	Na salt, butyl ester	Two pounds per acre
Acalypha indica	..	..	2, 4-D	Na salt, butyl ester	One pound ,,
Agropyron repens	Quack grass	..	2, 4-D, IPC	IPC 12 to 15 lb. in 100 gl. of oil per acre	
Alysicarpus rugosus	..	..	2, 4-D	..	Two pounds ,,
Amaranthus viridis	..	*Dhindo*	2, 4-D, MCPA	0.2 per cent concentration	..
Anagallis arvensis	Pimpernel	..	2, 4-D, MCPA	MCPA post-emergence	..
Argemone mexicana	Prickly poppy	*Kateli*	2, 4-D	Na salt, butyl ester	One pound ,,
Achyranthes aspera	..	*Chirchra*	MCPA	0.2 per cent	..
Alternanthera echinata	..	*Kachari*	2, 4-D, MCPA	MCPA=0.3 to 0.4 per cent	..
Bidens pilosa	Beggars sticks	..	2,4-D	Na salt, butyl ester	One pound ,,
Boerhaavia diffusa	Hog weed	*Punarnava*	2, 4-D	Na salt, butyl ester	Two pounds ,,
Borreira hispida	..	*Madanghanti*	..	..	
Brassica arvensis	Wild mustard	..	2, 4-D	Na salt	Half a pound ,,
Cassia tora	..	..	..	..	
Caesulia axillaris	..	..	2, 4-D	Na salt, butyl ester	One pound ,,
Chrozophora rottlerii	..	*Shahdevi*	MCPA	0.2 per cent	..
Corchorus olitorius	..	*Koshta*	MCPA	0.2 per cent	..
Celosia argentea	Quail grass	*Sarwati*	2, 4-D	Na salt, butyl ester	One pound per acre
Chenopodium album	Fat hen	*Bathu*	2, 4-D	Na salt	One pound ,,
Cichorium intybus	Chicory	*Kasni*	2, 4-D	High concentration	
Commelina benghalensis	Tropical spider wort	..	2, 4-D, MCPA	Na salt (2, 4-D)	Two pounds ,,
Convolvulus arvensis	Bind weed	..	..	2, 4-D post-emergence	One pound ,,
Corchorus triocularis	..	..	2, 4-D	Na salt, butyl ester	One pound ,,
Crotalaria striata	Rattle box	..	2, 4-D	..	..
Cuscuta reflexa	Dodder	*Amarbel*	2, 4-D	..	Two pounds ,,
Cyanolis axillaris	..	*Baghanulla*	2, 4-D	..	..
Cyanodon dactylon	..	*Doob ghas*	2, 4-D	Ester in diesel oil	..
Cyperus articulatus	Wild onion	..	2, 4-D	..	..
Cyperus iria	Yellow sedge	*Motha*	2, 4-D	..	..
Cyperus rotundus	Nut grass or coco grass	,,	2, 4-D	Ammonium salt, butyl ester, ester in diesel oil	

Scientific name	Common name	Vernacular name	Compound	Remarks	Dosage
Datura fastuosa (*D. metel*)	Thorn apple	*Dhatura*	2, 4-D	Na salt, butyl ester	One pound per acre
D. stramonium	Jimson weed	,,	2, 4-D, MCPA	..	One pound ,,
Echinochloa crusgalli	Water grass	*Sawank*	2, 4-D, DNOSAP	..	..
Eclipta alba	False daisy	..	2, 4-D	Na salt, butyl ester	..
Eichhornia crassipes	Water hyacinth	..	2, 4-D, 2, 4, 5-T, and MCPA	..	..
Eleusine indica	Goose grass	..	2, 4-D	Pre-emergence spray	Eight pounds per acre
Equisetum arvense	Field horse tail	..	2, 4-D	..	..
Eragrostis megastachya	Stink grass	..	2, 4-D	Butyl ester pre-emergence	One and a half pounds per acre
Eragrostis pilosa	India love grass	..	2, 4-D	Butyl ester pre-emergence	One and a half pounds per acre
Erigeron canadensis	Horse weed	..	2, 4-D	High concentration	..
Euphorbia geniculata	Spurge	..	2, 4-D	Na salt, butyl ester	One pound per acre
E. thymifolia	,,	..	MCPA	Na salt	One pound ,,
E. pilulifera	Asthma plant	..	2, 4-D, MCPA	Na salt, butyl ester	Two pounds ,,
Fimbristylis ferruginea	..	..	2, 4-D	..	One pound ,,
Galium aparine	Cleavers	..	2, 4-D, MCPA	I.P.C., (IPC+2, 4-D), IPC+MCPA	One pound ,,
Gomphrena decumbens	..	..	MCPA, 2, 4-D	..	..
Gynandropsis pentaphylla	..	*Hulhul*	MCPA	0.29 per cent	..
Helianthus annuus	..	*Surajmukhi*	2, 4-D	Post-emergence spray	One pound ,,
Helianthus tuberosus	Artichoke	..	2, 4-D	Post-emergence spray	Half a pound per acre
Hibiscus trionum	Flower of an hour	..	2, 4 D	Spray	Half a pound per acre
Hydrocotyle rutundifolia	..	..	MCPA	0.1 per cent	..
H. asiatica	..	*Brahmamanduki*	MCPA	0.2 per cent	..
Hypericum perforatum	St Johns-wort	..	2, 4-D 2, 4-D+ 2, 4, 5-T	Foliage spray	..
Indigofera glandulosa	Indigo	*Jangli neel*	2, 4-D	Na salt, butyl ester	One pound per acre
Ipomea calobra	Weir vine	..	2, 4-D	..	..
Ipomea purpurea	Morning glory	..	2, 4-D	Na salt, butyl ester.	Half a pound per acre
Ipomea muricata	..	..	2, 4-D	Na salt, butyl ester	One pound ,,
Ipomea reniformis		..	2, 4-D	Na salt, butyl ester	Two pounds ,,
Jussiaea repens	Clove-strip	..	2, 4-D	Na and triethanolamine salts	..
Lactuca virosa	Wild lettuce	..	2, 4-D	..	..
Lagascea mollis	..	..	2, 4-D	Na salt, butyl ester	One pound ,,
Lantana camara	Lantana	..	2, 4, 5-T	Ester foliage spray	Two treatments
Lathyrus aphaca	..	*Jangli matar*	2, 4-D	Na salt high concentration	
Leucas aspera	..	..	2, 4-D	Na salt, butyl ester	One pound per acre
Leucas stricta	..	..	2, 4-D	..	..
Liminocharis flava	Yellow velvet leaf	..	2, 4-D	Na salt and triethanolamine salt	..
Lolium	Rye grass	..	IPC	Applied to seedlings	Four to six pounds per acre
Malvastrum coromandelianum	..	..	MCPA	0.2 per cent	..
Medicago hispida	Bur clover	*Haina*	2, 4-D, MCPA	2, 4-D Na salt	..
Mimesa pudica	..	*Lajwanti*	MCPA	..	..
Mirabilis jalapa	(4-o-Clock)	..	2, 4-D	Na salt	Two pounds per acre
Monochoria hastaefolia	..	..	2, 4-D	Na and triethanolamine salts	..
Monochoria viginalis	..	..	2, 4-D	,, ,, ,,	..
Nicandra physalodes	Apple of Peru	..	2, 4-D	Na salt, butyl ester	One pound per acre
Ocimum canum	Hoary basil	*Ban tulsi*	2, 4-D	Na salt, butyl ester	One pound ,,
Oldenlandia corymbosa	..	..	2, 4-D	Na salt	Two pounds ,,
Opuntia humifusa	Prickly pear	*Thor*	2, 4,5 T	Ester in oil, foliage spray	..
Orobanche cernua	..	..	MCPA	0.2 per cent	..
Panicum sanguinale	Pigeon grass	..	LPOF	(Light patroleum oil fraction)	..
Phalaris canariensis	Canary grass	..	IPC	12 to 15 lb. in 100 gl. oil per acre	..
Pistia stratiotes	..	*Jalakumbi*	MCPA	0.2 per cent	..
Phyllanthus urinaria	..	..	2, 4-D	..	One pound ,,
Physalis minima	..	*Chirpoti*	MCPA	..	..
Plantage major	..	*Bartang*	2, 4-D	..	..
Portulaca oleracea	Pursalane	*Kulfa*	2, 4-D	Ammonium salt four pounds Na salt one pound Butyl ester 1.5 per acre	
Prosopis juliflora	..	*Walayti kikar*	2, 4,5-T	Ester in oil water	

Scientific name	Common name	Vernacular name	Compound	Remarks	Dosage
Psoralea corylifolia	..	*Bawchee*	2, 4-D	Na salt, butyl ester	One pound per acre
Rosa bracteata	..	*Jangli gulab*	2, 4-D	Ester in water	..
Ruellia prostrata	..	*Kalighavani*	MCPA	0.2 per cent	..
Rumex acetosa	..	*Khatta palak*	2, 4-D	Ester in water	..
Sesbania aculeate	Indigo or coffee weed	..	2, 4-D	..	..
Sesuvium portulacastrum	..	..	2, 4-D	Na salt, butyl ester	Two pounds „
Setaria glauca	Yellow foxtail	..	2, 4-D, MCPA	Na salt high concent	..
Solanum auriculatum	Bung tree	..	2, 4-D	High concentration	..
S. nigrum	Black night shade	*Makho*	2, 4-D	Na salt butyl ester	One pound „
Sonchus oleraceus	Sow thistle	..	2, 4-D	Na salts butyl ester	One pound „
Sonchus arvensis	..	..	2, 4-D, MCPA	Na salt	One pound „
Sorghum helepense	..	*Baru*	MH	..	..
Spergula arvensis	Spurry	..	2, 4-D, MCPA	Na salt as dust	..
Stellaria media	Chick weed	..	2, 4-D	High concentration	..
Striga densiflora	Striga	..	2, 4-D, MCPA	Na salt butyl ester	One pound „
Striga lutea	..	..	2, 4-D	..	One pound „
Tagetes minuta	Merigold	..	2, 4-D	Na amine salt	..
Tamarix gallica	Salt cedar	*Jhau*	2, 4-D	Ester in oil five per cent	..
Trianthema decandra	..	*Gadabani*	MCPA	..	..
Tridax procumpens	..	..	2, 4-D	Na salt, butyl ester	One pound „
Uvularia sessilifolia	Wild oat	..	2, 4-D	Foliage spray	..
Verbascum thapsus	..	*Gidar tambaku*	2, 4-D	Foliage spray	..
Vitis riparia	River bank grape	..	2, 4-D 2, 4, 5-T	Ester and foliage and cut surface spray	..
Xanthium strumarium	..	*Jogru*	2, 4-D	Na salt, butyl ester	Two pounds „
Xanthoxylum	Prickly ash	..	2, 4, 5-T	Foliage spray	..

A thick luxuriant and perfect cover for your soil

This Wonder Plant, KUDZU



This was how kudzu stood after a year

by
R. T. Gandhi

In August 1945, kudzu was first planted on the Indian Agricultural Research Institute Farm in New Delhi to see how this wonder plant, as it is called in the United States, would behave under Indian conditions.

Kudzu vine, a perennial legume originally grown as an ornamental plant, is extensively used in the United States for soil conservation and pasture. Like many other leguminous plants, it is a valuable forage plant and a good crop for rotation and soil improvement. In the States, it is used for reclaiming gullies, stabilizing highways, fillbanks and railroads against erosion. It also makes excellent hay.

In the first year at the Institute Farm, the plant showed satisfactory but slow growth, but later disappointed every one by completely drying up by the end of November. At the beginning of the next spring, however, the plant developed buds which sprouted and sent out shoots in all directions. The viny branches developed roots at the nodes wherever they touched the moist soil during the monsoon.

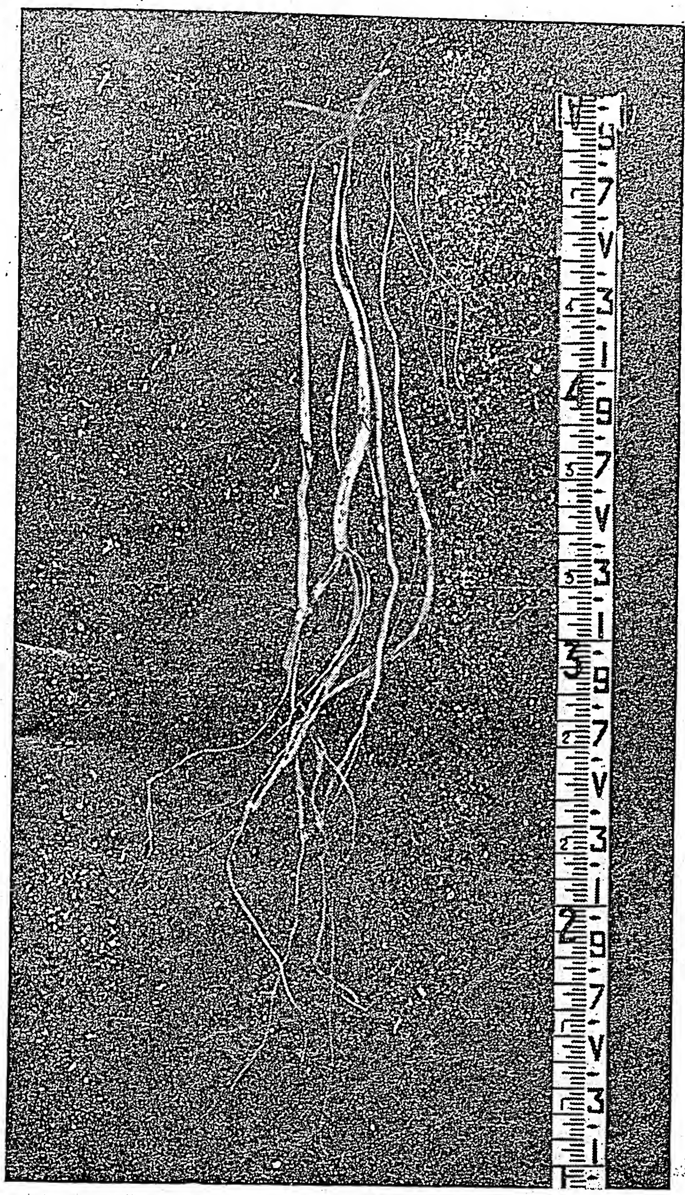
The year following, each node that struck roots turned out to be an independent plant. The branches on the roots developed at the nodes formed a thick network, densely covering the field and preventing the washing away of the soil.

Within a year of growth, the vine had shown a good spread and thereafter a vigorous growth of as much as 8.7 cm. per day, some shoots extending to more than 50 ft. in length. The plant covered an area of 0.14 acre by 1950 and since then has been trailing on the fence provided, presenting a thick, luxuriant and perfect cover four to five feet thick.

The well developed roots of kudzu are fleshy and go down more than five feet into the soil, reaching the moisture zone within two years of growth. Thus once established it does not require any irrigation from the third year onwards.

There are in all 12 species of kudzu of which seven are indigenous to India. A number of them have been collected and are under observation at the Institute. One important species is the kudzu vine of Assam (*Pueraria hirsuta*). This species grows in the Khasi hills of Assam and goes by the local name of *suting*. Cattle and buffaloes are said to browse on it. Under Delhi conditions, Assam kudzu has shown an average growth of 2.2 cm. per day though it is comparatively

much smaller than the U.S.A. strain. However, it is not affected by low temperatures as against the U.S.A. strain which gets badly damaged and dries up completely during the winter. The winter hardiness of the species is one striking feature and useful in prolonging its period of usefulness. Other species under study are *Pueraria tuberosa*, *P. phaseoloides* and *P. wallechii*.



Fleshy roots developed by kudzu in two years

The U.S.A. strain of kudzu vine grows well on all types of soils of medium to high fertility. It grows best on a well drained, loamy and fertile soil. On sandy or poorly drained heavy clays it does not do well. The plant does not establish successfully where there is a rock or a hard pan below the soil surface and where alkaline or acidic conditions exist. Kudzu has shown excellent growth in plains with medium rainfall, and on hills up to an elevation of 5,000 ft. In the plains where the winter is milder, kudzu remains green throughout the year but shows no growth during the winter months. Where the temperature falls below 50°F, the leaves and the tender vines dry up completely and the shed leaves add a lot of organic matter to the soil. Kudzu remains dormant till spring, showing new growth when the minimum temperature rises above 50°F.

CULTIVATION METHOD

Establishing kudzu vines from seed has not been found satisfactory in Delhi. Raising them by rooted cuttings also did not succeed very much. The best method of raising kudzu has been by planting crowns during January-February. A crown is a swollen node, triangular in shape with two or three fleshy roots and a few sound buds. The crown is dug out from the field when the plant is dormant during December-January. From an acre of kudzu about 15,000 to 20,000 well developed crowns can be dug out. These stand transport well for more than a period of ten days and still show 60 to 70 per cent of sprouting and establishment.

The crowns can be planted directly in the field, in a nursery bed or in earthen pots. Planting directly in the fields is desirable as the young plants grow undisturbed from the very beginning. This, however, is possible only where the plants can be regularly irrigated and protected from being eaten away by animals. Planting in a nursery has the advantage of the convenience of watering a small plot. The bed, however, needs good preparation and adequate manuring for raising the seedlings. The propagation of crowns in earthen pots is costlier, but plants can easily be transplanted without damaging the roots which generally happens when other plants are transferred from nursery to field.

It is desirable that the earthen pots are of 12 in. diameter and are filled with a mixture of soil and finely powdered farmyard manure in the proportion of 1 : 1.

Crowns need planting in narrow pits dug to a depth of 9 to 12 in. or to the length of the roots. Crowns may be covered with about half an inch layer of soil in the case of light soils and planted level with the surface in the case of heavy soils. The soil around the crowns should invariably be kept moist. Overwatering should be avoided because it will make crowns and roots rot and the new plants wither. The crowns sprout in a week's time when the minimum temperature rises above 50°F, usually by the end of February or beginning of March.

Plants thus raised can be transplanted in the fields after the start of the monsoon.

The plants should be lifted up from the nursery with a block of soil of about 10 in. in diameter and about a foot in depth taking care to keep it intact. In the case of earthen pots, the plants with the soil block can be easily taken out by shaking or by carefully breaking the pot.

In the selected field, pits 2 ft. × 2 ft. × 2 ft. may be prepared and adequately manured well in advance of planting. The farmyard manure used should be well decomposed to avoid white ant attack on the tender growing plants. Plants should be so transplanted that the top of the soil block remains two to three inches above the soil surface to avoid water stagnating around the crowns. The planting distance depends on how quick the cover is required. Crowns may be planted 15 to 30 ft. apart, which means 50 to 200 plants would be required per acre.

The field should be regularly cultivated for one or two years after kudzu has been planted to keep down weeds and ensure a good growth of plants, and also make the soil surface favourable for roots to develop at the nodes of the vines. Covering the vines at the nodes with the soil during the monsoons will ensure rooting and greatly increase the number of plants, thus forming a quick cover on the field.

Well established plants may be manured with four ounces of ammonium sulphate. Plants should be well protected from grazing and trampling down by animals preferably for two growing seasons. If planted on slopes, it is necessary to raise small ridges around to protect the plants from being washed away by running water. Regular watering is needed for one or two years except during the monsoon period and depending on the rainfall of the area.

Kudzu does not stand frequent and close cuttings. It may be good practice to cut it twice or thrice a year. If regular cuttings are desired, two to three

In five years, a single kudzu plant showed this kind of thick growth

maunds of ammonium sulphate per acre per year should be applied to help plants maintain a high production of green fodder.

NUTRITIVE FODDER

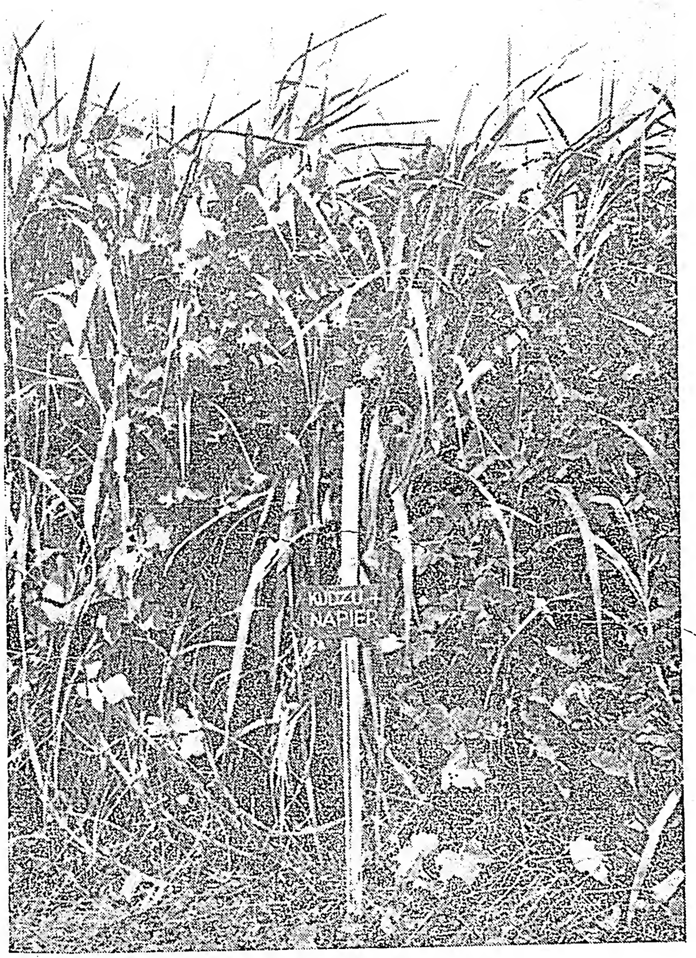
The kudzu vine is a nutritive green fodder, rich in protein, calcium and phosphorus. The legume cut in September before flowering here showed on analysis 17.93 per cent protein, 2.26 per cent calcium and 0.70 per cent phosphoric acid. It provides a good green fodder in April and May, a period notorious for scarcity of green fodder, especially where there is no irrigation.

At the Institute, kudzu yielded 447 md. of green fodder taken in three cuttings in April, August and October. The vine also made excellent hay. The fodder, both in green and hay forms was found to be cent per cent palatable, specially when the vines were tender. Recently, it has been shown that a mixture of kudzu vine and Napier grass is richer in protein than grass alone. The mixture which is under study, is 17 per cent legume and 83 per cent grass by weight.

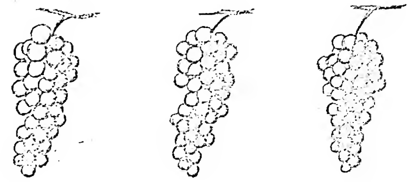
Kudzu vine is profitably utilised for erosion control on steep slopes, highway banks, gullies and water-ways. Its coarse, vigorous and rapid growth makes it useful for places where most grasses or other legumes do not come up.

Crowns and potted plants are available at the Division of Agronomy, Indian Agricultural Research Institute, New Delhi, for supply to farmers during December-January and June-July, respectively.

Kudzu and Napier make an ideal grass-legume mixture



Flowers of kudzu



LOOK TO FRUITS FOR HEALTH

YES, fruits are just the things you need to ensure good health for everyone in the family. In addition, they are the best appetizers going with their appealing shape, colour and flavour.

For adding health values to the food there is nothing like fruits. They have a comparatively low calorie value, which in itself can be an asset. They have a high proportion of water which has no nutritive value, but plays an important role in the body by helping the various body processes go smoother. Fruits contain cellulose. This aids digestion. Fruits are rich in vitamins, the quantity varying, of course, with the kind of fruit, and different conditions of soil and season even in the same fruit.

Th calorie value of the fruit lies chiefly in its carbohydrate content, which is mostly in the form of sugar. Dried fruits from which a large amount of water has been removed, have a comparatively high calorie value. The calorie value of canned fruits is increased because of the sugar syrup used with them.

Since the sugars in the fruits are in simple form, they are easily digested by a normal person. The colour and flavour of fruit help to sharpen the appetite, increase the flow of digestive juices so that digestion and absorption are made very easy.

In consuming fresh fruit, remember that it should be ripe but not overripe. Bananas should preferably be eaten when the skins have brown spots on them. For infants, they should be given mashed or strained. Certain fruits which are not easy to digest are best eaten after cooking.

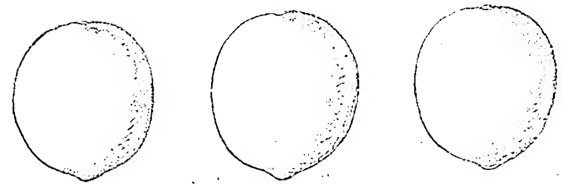
Some fruits like apple when eaten with the skin on provide an appreciable amount of bulky residue which aids in the movement of bowels, thus increasing the benefit from fruits. The skin of apples, however, may be found constipating to some people. Fruit acids in general are a good laxative.

Taking fruits like citrus or tomatoes once a day will be an excellent way to health. These fruits give the necessary quantity of vitamin C required by the body. In caddition, other fresh, cooked, anned or dried fruits may also be taken.

Some people believe that fruit acids cause acidiosis. This is not correct. Fruit consumption, however, can be restricted in case it does not agree with the system.

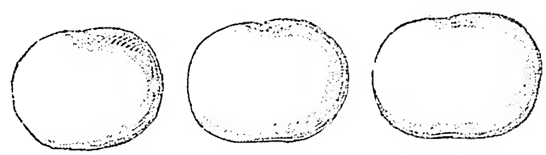
Talking of vitamins, fruits contain them in liberal amounts. Almost all fresh fruits contain vitamin C. The majority of fruits supply some other vitamins too.

Some people cannot do without a lemon. In fact, it is a good habit to have the lemon to bring out the best in most vegetables and restore the vitamin C lost in cooking. Pure lemon juice added to fresh salads bring out hidden flavours.

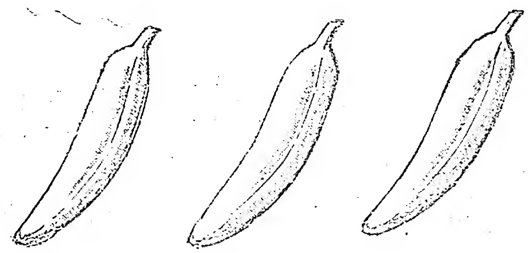


OVERWEIGHT

A reader asks the question : How can overweight be reduced ? Here is the answer: In most cases overweight is either due to overeating or eating the wrong kinds of foods. Overweight means an added strain on the heart, blood vessels and kidneys and increased risk of diabetes or incidence of other diseases.



Overweight can, to a large extent, be corrected by regulating the diet. In such a diet, foods rich in carbohydrates and fats should be reduced. On the other hand, protective foods such as fresh vegetables and fruits should be taken in plenty. Foods usually allowed include eggs and dairy products (*lassi* is specially good), lean-meat, soup, vegetables and fruits.



READERS WRITE

MESQUITE

I was very much interested to read "Mesquite Likes the South" ('Indian Farming', November 1954). If cultivated fields and flowers and vegetable gardens have to be protected against the onslaught of cattle, sheep and goats and produce good crops, then an attractive and foolproof live fence is a great necessity, and Mesquite appears to fulfil these conditions. I am going to grow Mesquite for fence on our Farm.

—C.B.S.

COMPOSTING PHOSPHATES

I highly appreciated 'Compost' your Phosphatic Fertilizers ('Indian Farming', November 1954). This is the type of articles we practical farmers need. But since 'Indian Farming' is for the use of progressive farmers, why give articles like "Let's Talk Soil Conservation", and "From Blackboards to Flannelgraphs"? These are meant for village level workers.

—G.D.S.

Indian Farming is widely used by Extension workers too.—*Ed.*

ONIONS

The article, "Growing Onions" ('Indian Farming', September 1954) is so explanatory that one can act directly and be an onion grower. Do publish more of such articles.

—M.R.S.

IMPROVED FOWLS

Can you tell me what improved breed of poultry is suitable for our area (Deodi, Bihar)? I am very much interested in poultry farming.

—F.M.K.

White Leghorn and Rhode Island Red are two breeds of fowls which will be found quite suitable for your place. The pullets of these breeds are very good layers and have been acclimatized to Indian conditions.

THE EDITOR

INVITES YOUR QUESTIONS & SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

Indian Farming

VOL. IV FEBRUARY 1955 No. 11

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EDITORIAL BOARD

SUBSCRIPTION RATES

Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

ISSUED BY

THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

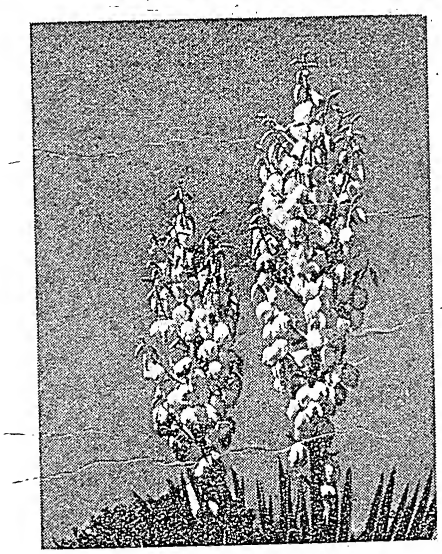
PRECISE AND PRACTICAL

THE Silver Jubilee Exhibition of the Indian Council of Agricultural Research, opened by the President of India in New Delhi on December 14 last, set a new pattern for educational and agricultural exhibitions. The Exhibition had 'better living through research' as its theme, and it was designed to draw the attention of the visitor to the part played by research in raising the standard of agriculture and animal husbandry in the country, leading to a higher standard of living. Research work during the last 25 years has been immense, but the Council selected a few instances of research directly leading to better living to substantiate the theme of the Exhibition. If the Exhibition was to bring to the notice of the layman the impact of research on everyday life, it was also to interest all those directly or indirectly concerned with farming in the various ways research was contributing to its progress.

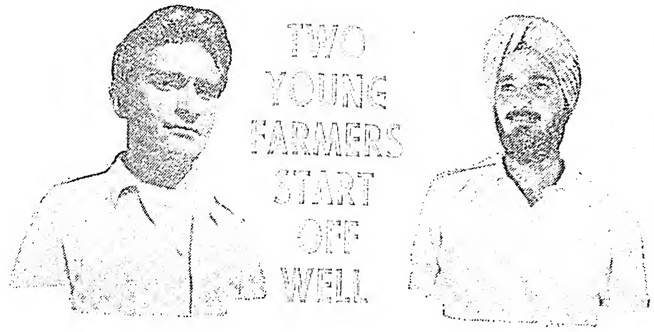
It brought forth a new idea, hitherto largely preached—to be precise and practical, without sacrificing one for the other. In about three dozen panels, the Exhibition showed the more important gains research had brought to agriculture and animal husbandry. Each panel was so designed as to create and hold interest because of its attractiveness and simplicity. Each panel again, whether on animal husbandry or agriculture, had but one message to communicate, such as 'ranikhet can be controlled' or 'the best fertilizer is a balanced fertilizer'. The why, where and how of it was indicated in as few words as possible. The exhibits placed with the panels were few, but helped effectively substantiate what the panel wanted to communicate. Here was an example of what a simple straightforward message, aided by an artistic layout, could do.

It also showed that putting up an effective educational exhibition need not involve a high expenditure, but could be done with a few cheaply available materials, if properly utilised. It also showed that a few simple but striking devices can take the place of many, usually cluttered up exhibits that generally try to bring in too many details about the subject and only end in confusing the visitor. The Exhibition has not only been of interest to the layman but also to those whose job it is to bridge the gap between the laboratory and the field through audio-visual methods.

OUR COVER



Flowers have a place in the countryside. The flowers on our cover page this month are of "Adam's Needle", a plant akin to the agave with which farmers are familiar. The plant, because of the sharp spines, can be as good a hedge plant as agave. It can yield fibre too



Kishore Thakurbhai *Anoop Singh*

WHEN youngsters prefer farming to higher education it augurs well for the country. Recently, I had occasion to meet two educated young farmers who had given precedence to the quiet village life over all the attractions of city life, and were 'progressing well' in their new vocation.

The first, Anoop Singh Sidhu, is successfully managing his 25-acre ancestral farm located at Paddi Jagir in tehsil Phillaur of Jullundur district of the Punjab. Leaving off college after passing his Intermediate from the Punjab University, young Anoop took to the cultivation of this sizable piece of land some three years ago, and subsequently won the first prize in the crop competitions held in the Nawanshahr Community Project Area, which includes his village, by obtaining a bumper yield of over 60 maunds of wheat per acre.

This achievement of Anoop's becomes all the more significant when it is known that he entered the field straight from the classroom almost a novice in the art of crop-raising. He overcame this handicap by having frequent consultations with the local agricultural officials whenever he was faced with a problem, and it would not be wrong to say that he actually 'learnt' agriculture from the Department.

The second, Kishore Chander Thakurbhai of Athwa, a small village in Chorasi taluka of Surat district in Bombay State, took over the cultivation of nine *bighas* possessed by his father, a few years ago. And since he took over, the yields on the farm have been rising progressively. At present they stand at 8 maunds, 30 maunds and 2,000 maunds per acre for cotton, paddy and sugarcane, respectively. Compared with local standards, these yields are big enough.

One thing that particularly struck me was the importance that this youngster attached to application of organic manure to his crops. He told me that all the cattle manure obtained from his large cattle herd comprising eight cows, seven bullocks, one buffalo, one bull and four calves was utilized for preparing compost for his fields. "Not only that", added Kishore enthusiastically, "we also purchase cattle dung from outside if our needs are not fully met from the farm cattle, and in addition, every bit of other farm wastes goes to the compost pit."—**H.K.S.**

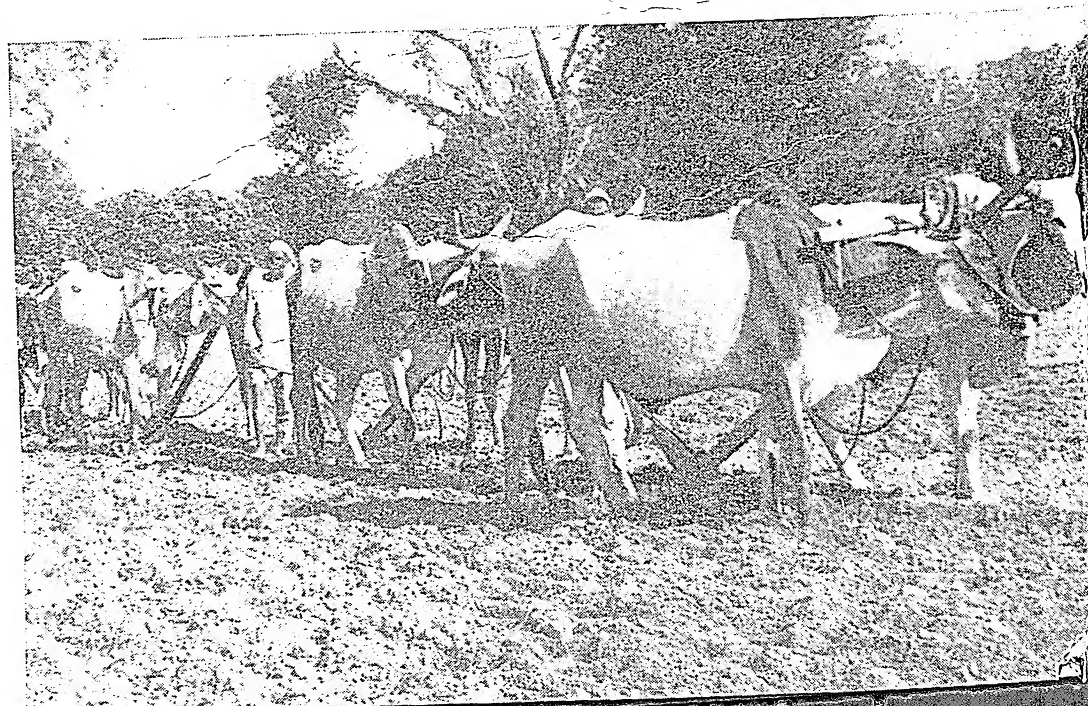
Shri Abdul Salam

Farming the Big Way

by
P. L. Jaiswal

SOME farmers are content if they can raise crop-yields a few maunds more than what are normally obtained. Some set their heart on mechanizing the farm and equipping it with the most modern gadgets. Once in a way you come across a farmer who is of another type. His aim is always bigger and better. Be the crop wheat, cotton or po-

More than one pair of bullocks operate on the Salam farm at one time



tato, or even pumpkin or papaya, he is not satisfied unless he grows the best.

I met one such farmer who does it the big way, last month. He is Shri Abdul Salam living in Sikandarabad in Uttar Pradesh, and known in the area as a producer of quality vegetables. To his credit are the growing of giant pumpkins and water-melons weighing over 50 seers each, papayas—seven to eight seers each and potato tubers weighing over a seer each.

Abdul Salam stumbled into farming about 19 years ago. To the 120 acres of ancestral land, all barren, he added 80 acres more, obtaining them from Government on a long lease, and made them into a farm as he wanted it to be.

The light loamy soil of the farm has responded well to Salam's efforts in building up a high state of fertility. Two tube-wells, recently bored, supply the water that this vegetable-cum-general farm requires.

I had a look at the young potato crop that Salam showed me with pride. He had enrolled as a competitor for the all-India crop competition this year in potatoes and this was the plot which was receiving his full attention. The field was thick with the dense green and healthy crop. I asked the farmer what seed he had used for sowing. "*Darjeeling Red Round*," he said, "this is a very high yielder." "Last year," he continued, "I got the second prize for the highest yield of potato in the State crop competition. But I am not satisfied with second prizes. This year I want to turn out to be the first prize winner."

METHODS ADOPTED

Salam had 25 acres of the farm under potatoes every year and this accounted for an income of over Rs. 5,000 annually for him. To my enquiry regarding the methods he adopted for getting big yields of the crop, he detailed:

"I sow early maize in these fields during the monsoon and give it enough of bulky manures. The incoming potatoes receive the benefit of this manure. I did get encouraging results by sowing *methi* for green manuring in the case of late crops, and have no hesitation in recommending it to others for raising the yields.

"I plough the fields thrice and apply 200 maunds of farm or city compost and 10 maunds of bone-meal per acre. Manure is incorporated into the soil well by ploughing, the clods are broken by planking and the soil levelled up." For planting, he used medium sized tubers measuring half to one inch and having one to two eyes. The seeds were sown on small ridges (*goolies*).

Comparing his favourite variety *Darjeeling Red Round* with another, the *Simla Special*, he said, "The first gives me a high yield and the second excellent tubers." But the *Simla Special* being of a shorter duration, he was able to grow two crops in the place of one.

Coming to the question of artificial fertilizers, Salam believes in a judicious application of the fertilizers to supplement the bulky manures he applies.

Harvesting sweet potatoes on the Salam farm

For potatoes, he said, he used ammonium sulphate (100 lb.) and the first irrigation was given after the crop was earthed up. Before earthing up, 20 maunds of castor cake was spread in the field.

By way of interculture, he gives two weedings, and a month after sowing earths up the crop. The irrigations total 15 in all at ten-day intervals, the intervals being reduced to four days during frost periods. Inquisitive about pests and diseases affecting such a good crop, I asked him whether he was worried by these pests at any time. He replied, "Yes. Last year, the crop had an attack from aphids, but this I got over by spraying tobacco soap emulsion on it."

With this much attention given to the potato crop, Salam gets an average acre-yield of 650 to 700 maunds which is a big yield indeed. As with potatoes, so with the other crops he grows such as peas, cauliflower, cabbage, gram, onion and chillies.

Looking at the peas crop the farmer treated me to a discourse on the growing of peas. The peas crop was also a big one.

"*Marrow Fat* is the American variety that gives me four-inch long pods and very sweet peas. It averages 40 maunds per acre, but I have another variety, *Satha*, which is ready in 60 days' time, as its name suggests. I grow the garden pea *P. 163* too. I grow these two varieties because they are very sweet."

Other big things that Salam has been able to do on his farm are: a wheat crop that gave him 46 md. 36 sr. of grain and prize for the best crop in the District, Cotton *F. 216*, again a first prize winner in the Division, papayas, each weighing seven to eight seers. "I do not know what variety, but these papayas were got some time back from Indore. I did some selection over several generations, and the work has rewarded me at the end, " he said. Salam is a great believer in organic manures and more so in green manuring. The green manure crops very much in evidence on the farm were *methi*, *guar* and sannhemp.

Going round the farm I could not believe that once upon a time this was a barren land, but I was convinced that when a farmer sets his heart on doing bigger and better, he could do even a miracle with farming. Fifty-two-year old Abdul Salam has been the recipient of over a dozen crop competition prizes. But his is a seeking spirit, always hungering to produce crops—bigger and better, every time.

A result of 10 years' research in Madhya Pradesh

STRAIN 65 is a choice wheat

by

R.B. EKBOTE and P.K. KAUSHAL

OVER ten years of research in Madhya Pradesh on evolving a wheat variety that can not only yield better but also offer resistance to rust disease, has met with success. The new variety evolved is *Strain 65*, and was bred at the Wheat Breeding Station, Powarkheda (Hoshangabad).

Wheat research has been going on in Madhya Pradesh since the early years of the present century. A number of superior yielding strains were evolved, but none of them were so far resistant to rust. Because of rust incidence and lack of rust resistant varieties, the wheat area in the State was declining progressively and wheat growing was becoming a gamble.

In Madhya Pradesh, black smut rust is of common occurrence and there was no economic means of saving the crop once it was infected.

In June 1941, the State Department of Agriculture with the financial assistance of the Indian Council of Agricultural Research, initiated a scheme for breeding rust resistant varieties and the work was taken up at the Powarkheda Experimental Farm.

Since all local varieties of wheat were highly susceptible to the disease, work was taken up to cross these indigenous improved but susceptible varieties with foreign ones which are highly rust resistant.

Many of these crosses and their progenies were tested for rust resistance and other desirable characters for over eight generations.

Rust resistance is tested at the Research Station in Mahableshwar and selection for other characteristics done at Powarkheda.

Repeated testing for rust resistance and other desirable characters showed that some of the hybrids were promising. *Strain 65* is one of them. The strain was obtained by crossing the local improved *Sharbati Strain A.115* with *Bobin×(Bobin×Gaza)*, a rust-resistant Australian variety.

WIDE ADAPTABILITY

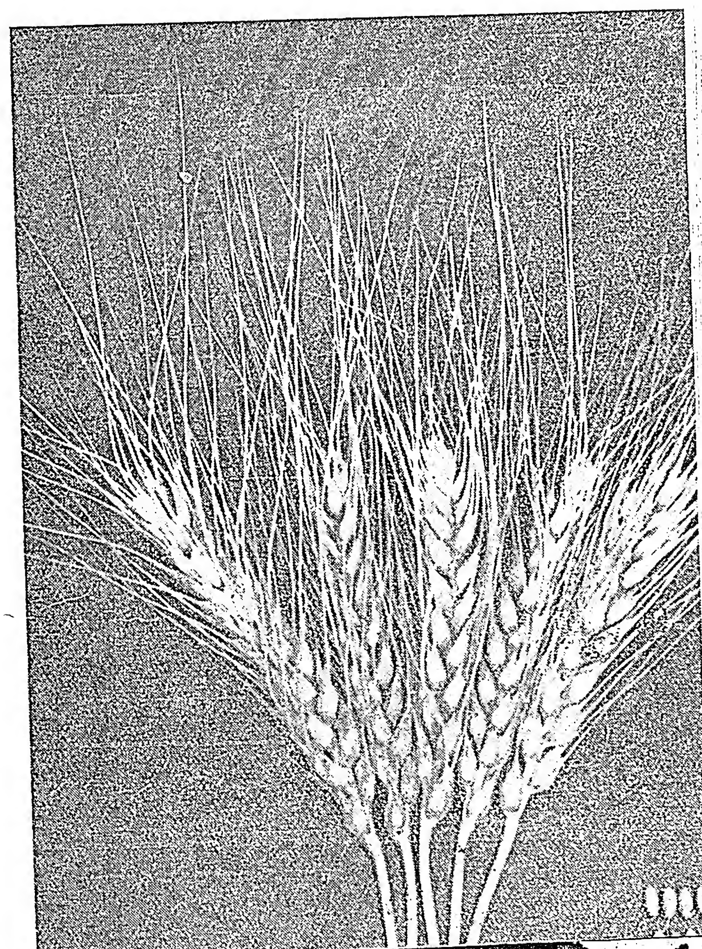
The new strain adapts itself to a wide range of conditions. It is mid-early in maturity, possesses a stout ear and plump grain rich in protein.

The three years during which this new strain was tried in the field had a sub-normal monsoon followed by a dry winter, yet the strain gave six to eight maunds per acre on average soils and 9 to 11 maunds on better or manured soils. Under irrigation, to which it is eminently suited, it yielded up to 50 maunds of grain. One progressive farmer last year harvested 62 maunds per acre. As a second crop after paddy or maize its outturn under irrigation has been a little over 25 maunds per acre.

As rust incidence has been only mild during the last three years, it has not been possible to ascertain how this strain on a large scale will face a rust epidemic. But trials under an artificially created epidemic showed that this strain outyielded the local improved but rust susceptible strain by over 300 per cent.

Strain 65 is indeed a choice wheat for intensive wheat farming in Madhya Pradesh. One progressive farmer having a large mechanised farm now grows this strain over 400 acres without irrigation.

Ears and grains of Strain 65



POUDRETTE-MAKING IS SIMPLE THIS WAY

A new method that is ideally suited for our villages

by

M.A. IDNANI

IN hundreds of villages and towns, the problem of disposal of human excreta still remains great. If the night-soil is trenched in deep pits, it may take over a year for the material to dry. If it is done in shallow trenches, it occupies a large area of the outskirts of the towns or the villages. In either case, the system offers no solution for getting rid of the foul smell and the fly breeding nuisances. Such night-soil depots may also become potential sources of danger to public health.

An effective solution to the disposal of the night-soil lies in composting it with street refuse by the Bangalore System. This has been introduced in a number of towns under the All India Scheme sponsored by the Indian Council of Agricultural Research. By this system, habitation wastes are not only disposed of sanitarily, but their utilization in farming is also made possible. As the night-soil is layered alternately with refuse in three feet deep pits, the foul smell and fly-breeding are completely controlled.

This system, however, can be adopted in towns where arrangements exist for a systematic collection and transport of both refuse and night-soil to a common depot for disposal. Another handicap is that the materials have to remain buried in the pits for over six months. This means that a suitable sized ground wherein some six months' collection of the waste can be accommodated on the outskirts of the town should be available.

Night-soil refuse compost is a bulky organic manure, containing over 50 per cent of moisture after it is ripe and about one per cent of nitrogen on a dry basis. Because the decomposition takes place in pits in the absence of the air, the final product may not be homogenous and may still have an offensive smell.

DEHYDRATION

An effective method of disposal straightaway of night-soil would be to dehydrate it by mixing it with suitable material like dry soil, ash, lime, etc. The preparation of such 'poudrettes', it is reported, was in vogue in some of the towns of India and there was a high demand for this type of manure from farmers wherever it was produced. In spite of this, however, the interest in this form of night-soil disposal seems to have been lost in course of time. Under the present conditions existing in many of our small towns and villages, poudrette-making offers a simple and effective means of quick disposal of the waste, yielding a product which can find use as manure of a high quality.

It is important that a suitable material is selected for admixture with night-soil to efficiently dehydrate it. Such a material should have a capacity for removing water and should not cause a chemical decomposition of the manurial ingredients present in the night-soil. The alkaline materials like ash and lime are likely to cause loss of nitrogen in the form of ammonia. If soil is mixed with night-soil, the organic matter and nitrogen get decomposed during storage. The materials also require to be added in large quantities to reduce night-soil quickly to a dry state.

Recent experiments conducted at the Indian Agricultural Research Institute showed that sawdust and dry broken leaves have a high capacity for extracting water and can serve as efficient materials for mixing with night-soil to form poudrette. Night-soil, containing about 70 per cent moisture, can thus be conditioned by treatment with 40 to 50 per cent by way of sawdust or dry leaves and left for further drying in the sun.

The dry poudrette obtained on analysis showed two to three per cent nitrogen and was in excellent physical condition for application as manure.

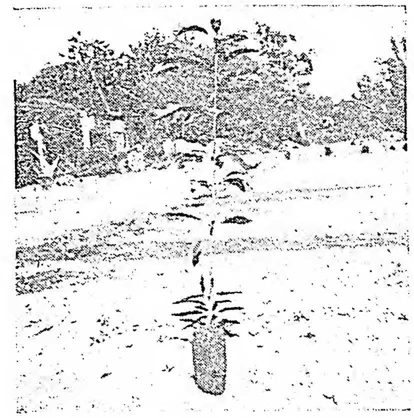
For preparing poudrette, night-soil can be treated in a shallow trench a foot deep and of suitable dimensions. A layer of the absorbing material is first spread in the trench over which night-soil is spread out, if necessary, with a long iron or wooden rake. Additional absorbing material is thrown over the night-soil and mixing done with the rake until the mixture is reduced to a poudrette. The material is then piled up in a heap to dry further in the sun and disposed of as manure a few days after, or stored in a shed or pit until required.

The poudrette system is simple and is ideally suited especially for small towns and villages. It has these benefits to offer: requires a small area on the outskirts of the town or village, quickly disposes the night soil, controls fly breeding and foul smell and produces a richer manure suitable for direct application without further fermentation. These are surely attractive enough for consideration of the Sanitary Authorities of our towns and villages.

mango grafting can be done cheap

by

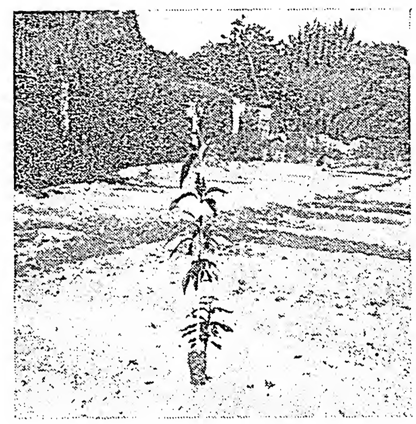
M.L. Garg



The seedling before grafting

At present, the cost of producing mango grafts is very high. But this can be substantially reduced if the method followed by me is taken up. The method does not involve watering as in the usual method of grafting.

Early in July, just after sufficient rain has been received, dig out mango seedlings, preferably a year old, with balls of earth. Store them in a cool, shady place and sprinkle water over the balls of earth, so the seedlings keep fresh and alive and the earth is softened. However, do not apply excessive water to avoid earth detaching from the roots.

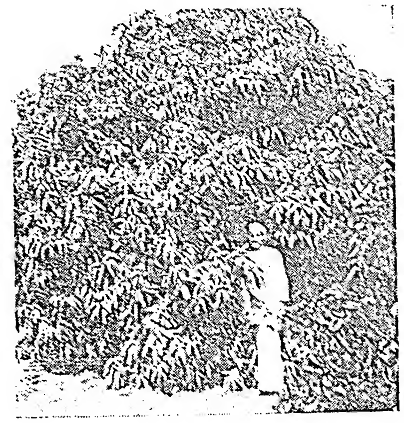


Mango seedling after surplus earth from the roots was removed

After a day or so, when the earth around the roots is still hard enough to handle, take the seedlings one by one and remove surplus earth, leaving out that part of it which contains the main and the fibre roots. Cover the earth with about an ounce of dry moss or soft hay, keeping it in place by wrapping a piece of cotton thread around. Dip it in water for about half a minute and store the seedlings close together in an upright position for about eight days. If, during this period, the earth tends to go dry, dip in water a second time.

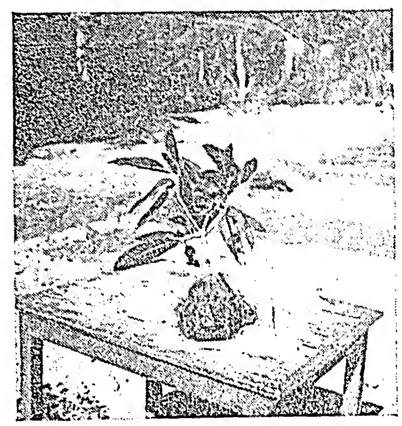
Seedling ready for grafting

Now, take a piece of alkathene film, or any such other film, about 8 in. × 12 in. in size, and make it into a bag. Prepare bags, one for each seedling, and put them over each ball. If the bags are loose, add more moss or hay to make them tight fitting. The mouth of the bag should be carefully tied with a piece of string. Tie another piece of string roundabout the middle of the bag to keep it from falling. All these precautions in covering the balls are necessary so as to keep out air, sun and rain water.



Grafting can be done on tall trees like this

The seedlings are now ready for grafting. Tie these seedlings on the mother trees close to branches suitable for grafting, i.e., stock and scion should be about the same thickness. Graft them in the usual manner and leave them to mature for about six weeks. During this period, the grafted seedlings would require no water or any other care, except protection from damage by squirrels and birds.



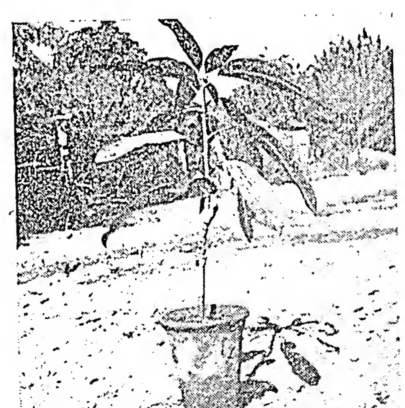
Ready graft detached from the mother tree

After about six weeks, examine the grafted seedlings to see whether they have made a perfect union. If so, sever the stock apex and also give a half cut to the scion base. Leave them again for another fortnight before detaching the grafts from the mother tree.

Put the detached grafts in *gamlas* (pots) or plant them in the soil in a cool and shady situation. These grafts are quite fit for planting in the fields and gardens.

The cost per graft according to this method works out as follows:

	Rs. a. p.
Cost of seedling	0-2-0
Cost of moss or hay	0-0-6
Cost of film and string	0-1-6
Labour charges for packing and grafting	0-2-6
Total	0-6-6



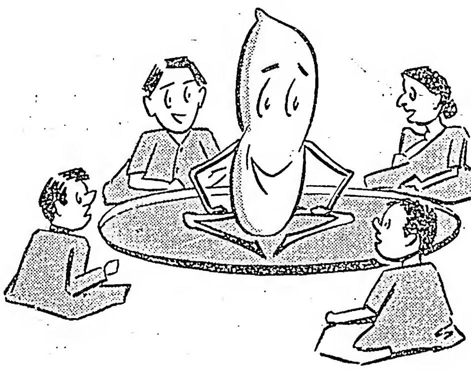
Ready graft put in a pot

As such, mango grafts prepared by this method can be sold for annas eight only, as against the usual price which ranges from Rs. 1-12-0 to 2-8-0. Another advantage is that grafts can be taken from big or tall trees without getting into extra expense or trouble of watering the grafts.

NEW GROUNDNUT

A NEW variety of groundnut is being tested in the groundnut-growing areas of Madras State. The variety goes by the name of *AH-6719*, a selection from a foreign type (*Virginia bunch*) tried at the Agricultural Research Station, Tindivanam.

The variety has yielded 79 and 56 per cent more than the local varieties in the two years of trial. It also is superior as an edible type possessing a high sugar content but low oil content. As such it will be, if the field trials are successful, a good variety for edible purposes. Though groundnut has a high nutrient value, it is not very much used for edible purposes in this country. We are the biggest producers of groundnut in the world, but our per head consumption per year is one pound as against 11 pounds in the United States. *AH-6719* will fulfil the need for a large-seeded type with good colour, uniform size and low oil content for dessert purposes as well as for confectionery.



HARVESTING POTATOES

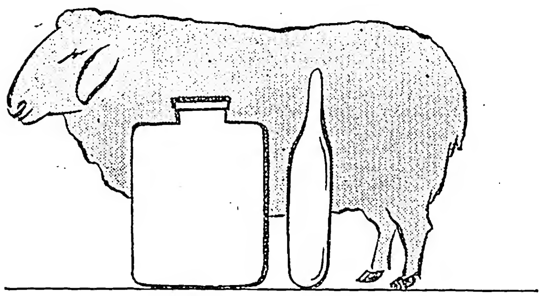
SHOULD the potato crop be lifted before the tubers are fully mature? This has been answered by research at the Agricultural Research Station, Nanjanad (Madras State).

In some western countries some farmers harvest their potatoes before they are fully mature. This is done with the belief that such immature produce can be planted as seed far in advance for the next incoming crop, and that it would be possible to prevent, to a certain extent, any virus disease already present from being conveyed to the next crop by the tubers.

At the Nanjanad Station, trials were conducted to test whether there was any special merit, with particular reference to yield, in using immature tubers as seed material. It was found that early lifting was not in any way beneficial. On the other hand, tubers lifted before they are mature always undergo a lot of skinning during harvest, resulting in a decline in their market value.

ANTHRAX VACCINE

A SUITABLE vaccine giving immunity to sheep and goats against anthrax for a longer period is now being largely used to fight the disease in villages.



Anthrax is an infectious disease of sheep and goats. Cattle also are equally likely to get the infection. In places where the disease is severe, sheep and goats die in large numbers. The disease spreads wherever carcasses of animals which had died of anthrax are opened. Human beings too get the disease while handling the carcasses or other infective material.

In sheep and goats, the disease is prevalent throughout the year. Annually, about 10 per cent of the sheep and goat population is lost due to the disease. There is no treatment for anthrax.

In the past, an anti-anthrax serum was being used for inoculation and afforded protection to the animals for about ten days only. Vaccination with the new vaccine has to be done once in three months in badly infected villages, and with the Anthrax Spore Vaccine, once

in six months. This has been found to control the disease and reduce the economic loss to farmers to a very great extent.

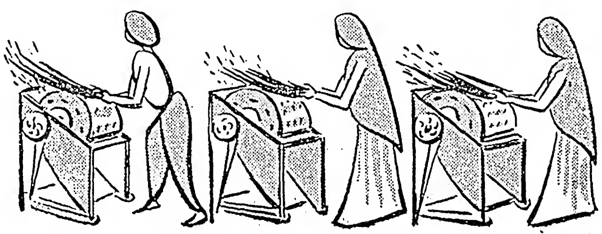
THRESHING PADDY

BIHAR farmers have a paddy threshing problem due to the insufficiency of bullock power at threshing time. The paddy harvested during late summer and early autumn is kept in heaped bundles locally known as *khalian*. This period is normally of heavy rains, and there is always the risk of paddy being damaged and straw becoming unfit for cattle feeding.

The Japanese type of paddy thresher offers a solution to this problem. Not only the paddy can be threshed during any time of the season even when it is wet, but the threshed paddy is also clean.

Recent trials have indicated that an adult and a boy can thresh eight maunds of paddy in eight hours with this machine. It can handle produce from about 15 acres by the close of the paddy season, that is, by the end of January.

The cost of threshing one maund of paddy by the machine comes to 7 annas as against $7\frac{1}{2}$ annas by the normal practice of threshing under the feet of bullocks and $13\frac{1}{2}$ annas by threshing with sticks. The machine costs about 125 rupees and farmers can either purchase it individually or on a co-operative basis.



What Farmers Say ABOUT PLOUGHING

जितना गहिरा जोते खेत।
बीज परे फल अच्छा देत।।

The deeper you plough, better the results.

कच्चा खेत न जोते कोई।
नाहीं बीज न अंकुरे कोई।।

The field should not be ploughed till it is dry, otherwise, no germination will take place.

बाहे क्यों न असाढ़ एक बार।
अब का बाहे बारम्बार।।

You did not plough your fields in *Asaarh* (June-July), now what is the use of repeated ploughings at this stage.

थोड़ा जोते बहुत हेंगावे, ऊंच न बांधे बाड़।
ऊंचे पर खेती करे, पैदा होवे भाड़।।

If you give a less number of ploughings, and more plankings, if you grow crops on raised fields and if you do not bund your fields well, you will get a crop of *bhandbhand* (*Argemone mexicana*) only.

दस बाहों का मांडा।
बीस बाहों का गांडा।।

Wheat needs 10 ploughings but sugarcane requires 20.

मैदे गोहूं।
ढेले चना।।

Wheat needs a finely prepared soil, while gram can be grown in a land full of clods and pebbles.

गोहूं बाहें, चना दलायें, धान बिदाहें,
मक्की निराये, ऊख कसाये।।

Wheat needs ploughings, gram nippings, paddy plankings when the crop is young, maize more weedings and sugarcane soaking the setts before sowing.

मघा मघारे, जेठ में जारे, भादों सारे।
तेकर मेहरी डेहरी पारे।।

If wheat fields get cooled in *Mahg* (November-December) and sufficiently heated in *Jeth* (May-June) and manure has rotted in them in *Bhadon* (August-Septembre), heavy yields will be obtained. **—P.L.J.**

You Can Crop That Fallow

ARE you one of those farmers who let the land lie fallow after the *rabi* harvests have been brought in till about the break of the monsoon?

The fallow field, unless it has been protected with pukka bunds all round, you may be surprised to learn, will be subject to heavy soil erosion. Agricultural scientists say that three to five tons of the rich topsoil, even if the slope of the land is gentle, is eroded out of an acre. This, by any standard, is a pretty heavy loss.

The enormous waste can be stopped if the fallow gives place to a summer catch crop. This crop can serve as a good cover crop.

You have the choice of some really suitable catch crops to select from. Cowpea is one. *Moong*, *urid* and groundnut are others.

Cowpea is a leguminous crop. It does not exhaust the nitrogen of the soil, but on the other hand, makes phosphates and potassium available to the next crop. It affords a complete cover to the soil.

Moong can successfully be employed as a cover and cash crop. It yields a good quantity of green fodder, and increases the yield of the wheat crop that follows it. It covers up the land, stops erosion and builds up plant food reserves in the soil. The green matter when turned in decomposes easily, adding up about 40 pounds of nitrogen to the soil. Double cropping on medium fertile soil with *moong* as the catch crop, it has been found, gives an additional 10 maunds of *moong* and wheat.

Another catch-cum-cover crop is *urid*. It is, however, less suitable for areas where rains usually cease early and wheat has to be grown early in the season. As a pulse crop, it can yield about five maunds of seed, and about 65 to 79 maunds of fodder can be obtained from it after about 75 days of growth.

As a cash and cover crop, groundnut is popular with many farmers. In Madras, experiments have shown that on dry land *sorghum* and *varagu* benefit if they follow groundnut. In Mysore, growing early maturing varieties has made it possible to follow up groundnut with a second crop of horse gram or late season *sorghum*. In the State, long season groundnut is rotated with *ragi* in the irrigated areas. In garden lands, groundnut is rotated with rice.

Barley and wheat invariably follow groundnut in the Ludhiana tract of the Punjab. The growing of groundnut and winter cereal as a double crop is turning popular in certain parts of Uttar Pradesh.

Results of experiments are pointing out to the desirability of growing groundnut as a cover crop preceding the autumn crops grown principally in the north-east monsoon.

NEW ROTARY MACHINE CUTS SIEVING COSTS

by

SHIV DAYAL and R. V. RAMIAH

ON the outskirts of some of our large cities, town refuse and other unwanted material are dumped in heaps. These contain not only composted material, but also such other material as brickbats, stones, glass pieces and broken earthenware.

Farmers are getting increasingly aware of the usefulness of the compost for their crops, and the demand for such material is on the rise.

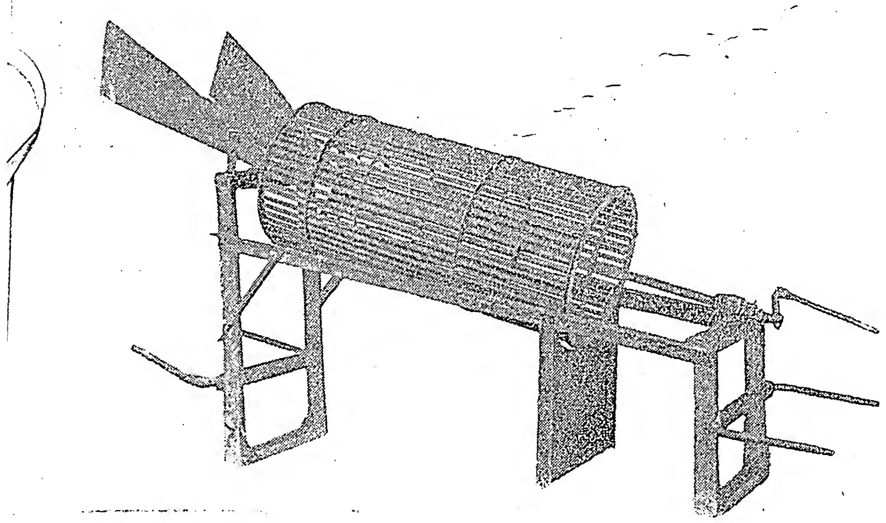
But unless the unwanted material is separated out from the compost, it will only add to transport costs, and the glass pieces, brickbats and stones may injure the feet of men and animals, when spread on the fields. Hence the unwanted stuff has got to be separated from the good manure at the dumps before disposal.

Expanded metal sieves, similar to the one used for sieving and grading stone jelly for use in concrete have been used for this purpose for a long time. The cost of screening manure by this method, however, is high, as the output of screened manure from a single sieve is low.

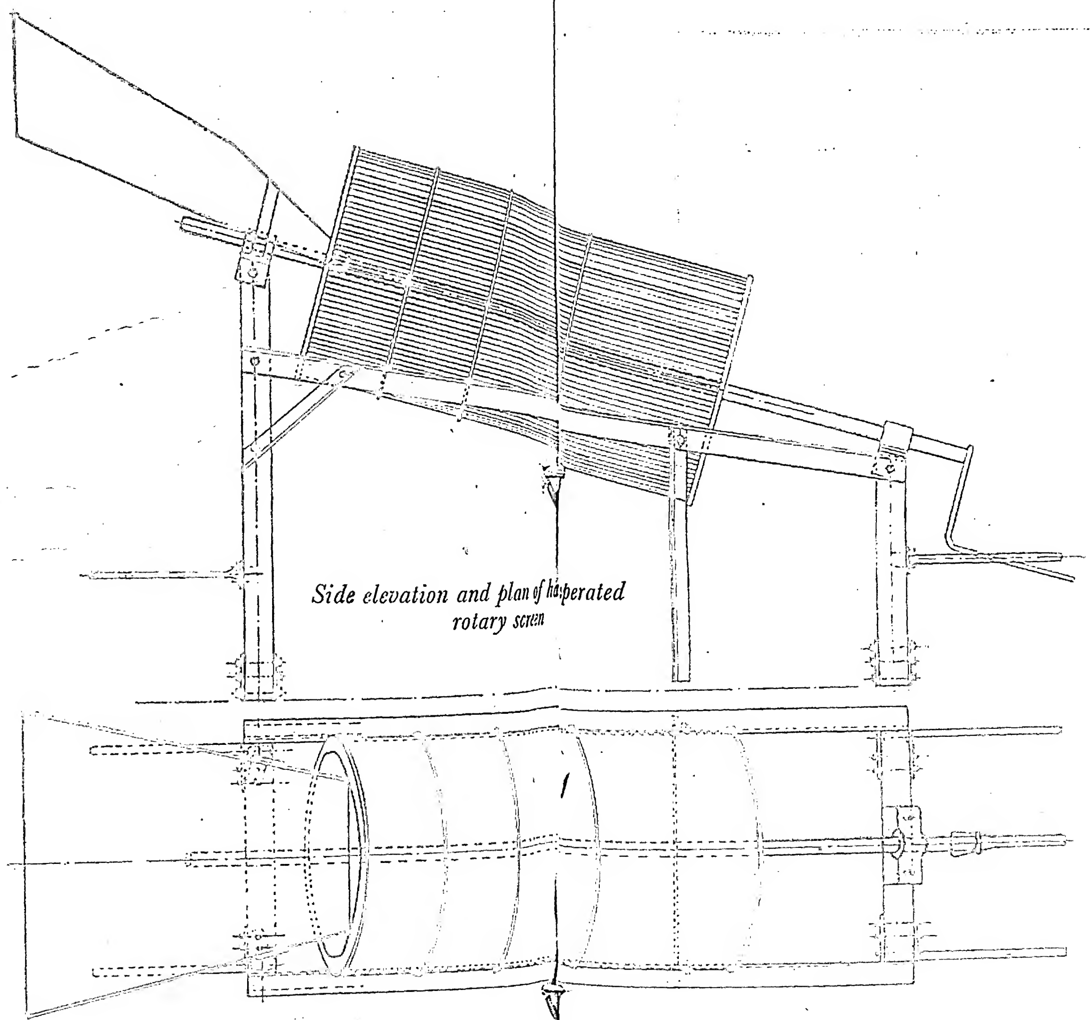
I.A.R.I. EFFORTS

The Division of Agricultural Engineering of the Indian Agricultural Research Institute, New Delhi, working on the design and development of a suitable machine to carry out the process of screening manure cheaply and in a sufficient quantity, designed a revolving drum, the periphery of which consisted of conduit pipes longitudinally placed at suitable distance apart, with three flat iron rings at intervals to strengthen the revolving drum. The drum was mounted on a wooden frame and inclined at an angle of 35° to the ground. This device, called the rotary screen, when revolving at 20 to 30 revolutions per minute, freed the compost manure of the unwanted stuff. The material was fed at the raised end, the brickbats, stones and glass pieces were separated, and the manure collected at the lower end of the machine.

A more mechanised and larger unit of the rotary screen was also fabricated and tried at the Badli manure dump yard near Delhi. This unit had an engine to rotate the drum and the feeding of the material to the hopper was done by a tractor attached with a manure loader. The screened compost coming out of the machine was automatically elevated and put into standing lorries. The elevator was driven by petrol engine of a small Horse Power. This complete outfit and the manually operated rotary screen were tried and worked simultaneously at the dumps to compare their output and cost of operation.



Hand rotary screen in its final form with a steel frame and a detachable drum, and the partition plate shifted towards the discharge end



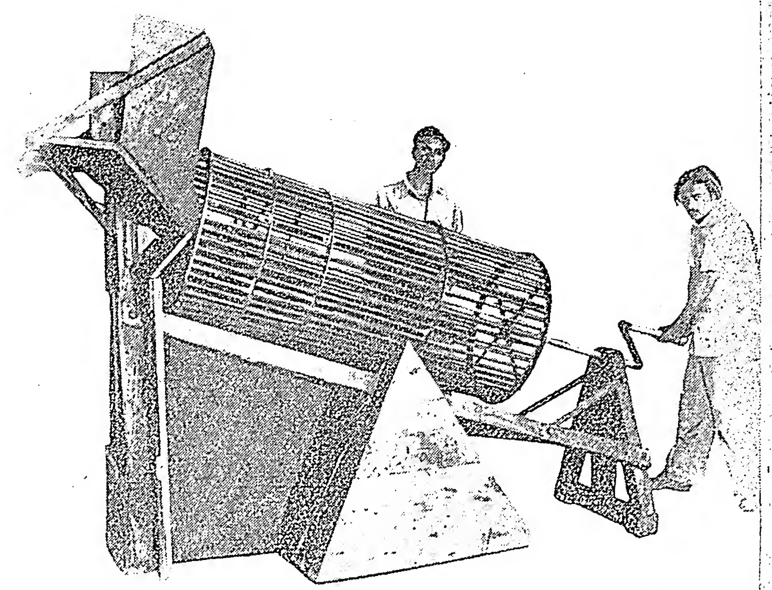
Side elevation and plan of hand operated rotary screen

Wherever there are compost dumps, this machine will be of great help

The manually operated rotary screen gave an output of 12 tons per day, at a cost of Rupee one per ton. With the power operated machine fed with the tractor and loader, though the output of screened manure was eight tons an hour, the cost of sieving worked out to Rs. 1-14-0 per ton on account of the high cost of the skilled labour employed and depreciation charges.

Six manually operated rotary screens, therefore, were fabricated and put into continuous operation at Badli dumps to supply the screened manure to farmers of the villages around Delhi.

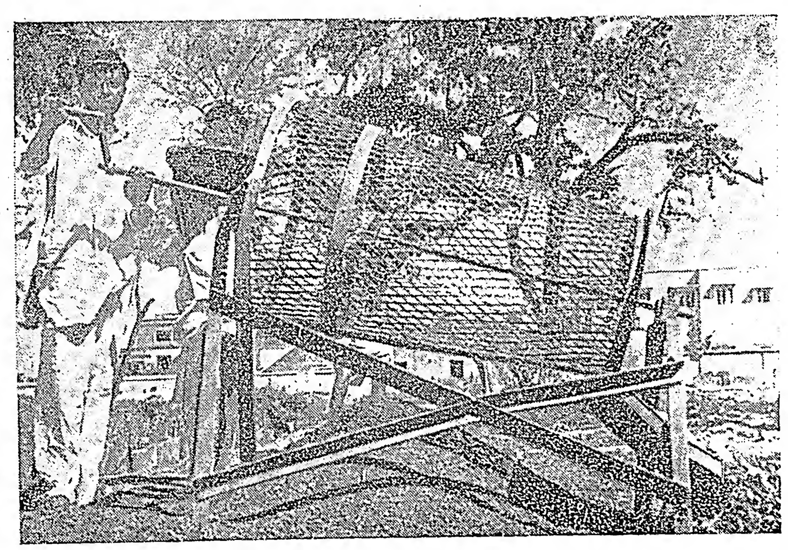
On working these hand-operated machines for some time, it was found necessary to effect some improvements in them. The machines were too heavy to carry from place to place, and as such it was decided to make the revolving drum detachable from the frame, so that the drum or the frame could be shifted easily by two or three men from place to place in the dump yards. A small percentage of the organic matter, which could be quite useful as manure, was being lost in the machine. This was remedied by shifting the partition plate more towards the discharge end. The wooden frame, which badly gave way under constant use, was replaced by a rigid steel frame of simple and robust construction.



Hand rotary screen as originally fabricated with a wooden frame and fixed drum

The screen in its final form now consists of a revolving drum on a mild steel shaft set at an angle of 35° to the horizontal. The outer periphery of the drum is made up of conduit pipes and flats suitably spaced. The higher end of the drum has a chute for feeding the manure into the screen and the lower end of the drum shaft has a handle which is used for

Conically shaped rotary screen designed and constructed by the Agricultural Engineer, Hyderabad State



rotating the screen. The whole drum is mounted on a steel frame.

The manure to be screened is fed at the higher end and the drum is rotated by hand. The good manure is screened through the space between the conduit pipes and the unwanted stuff, consisting of brickbats, glass pieces, broken pots, etc., is collected at the lower end of the screen. A partition plate is provided to keep the screened manure separated from the unwanted stuff.

The machine when worked by six labourers, is capable of screening 12 tons of manure per day at an approximate cost of Rupee one per ton. A number of these machines are now working at the Badli dump yard near Delhi for screening the manure and supplying to the farmers in the surrounding villages. A few such machines have been manufactured by a local workshop to the order of the Ministry of Food & Agriculture for supply to municipal committees.

MANUFACTURING DETAILS

Manufacturing details of the machine are given below:

The drum is 24 inches in diameter and 54 inches long. The periphery of the drum contains 48 conduit pipes, with a $\frac{3}{4}$-inch outside diameter. Mild steel flats are welded round the periphery, and these help to pulverise the manure. The shaft is of mild steel, $1\frac{1}{2}$ inches in diameter and eight feet long, and works in cast iron bearings.

The frame is made up of two channel iron pieces 6 ft. 6 in. apart connected together with angle-iron distance pieces. Two lifting handles are provided at both ends of the frame for lifting and transporting the frame from place to place.

The chute is made up of mild steel sheet with supporting cleats bolted to the frame. This acts as a feeding hopper for the screening drum.

The machine is not covered by any patent and there is no objection to its being manufactured from the details and dimensions given above. Detailed manufacturing drawings for the screen can be had from the Head of the Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi-12, at a cost of Rupees five per set.

A similar machine with some modifications has been designed and constructed by the Agricultural Engineer, Hyderabad State. This screen consists of a conical drum four feet long and 30 inches in diameter at the inlet and 20 inches at the outlet. There is no feeding hopper. The conduit pipes on the periphery have been replaced by expanded metal so as to make the screen quite cheap. The machine is claimed to have given satisfactory performance when revolving at a speed of 40 revolutions per minute.

GOOD RESULTS WITH PUPPETS

Hold your audience with an inexpensive teaching aid

THERE is an art simple to learn and make use of for your programmes—puppetry. It is inexpensive, and can get good results.

Even crudely made puppets, when played with a lively sense of drama can hold an audience. Thus they can be an effective aid in teaching a lesson about health, literacy, agriculture or home making.

Puppets are of four types. Glove or hand puppets, marionettes or string puppets, rod puppets and shadow puppets. Each type has its own limitations and advantages, but the glove or hand puppet is the simplest and the one suggested for your use.

It is like a three-fingered glove which fits on the hand. The first finger is inserted inside the head and used to bring about movements of the head. The middle finger and thumb fit in the hands and move them. The dress of the puppet covers the hand and forearm. One person can operate two such puppets at a time.

A simple puppet can be made this way. Roll a piece of cardboard (an old postcard will do) around your first finger. Glue it to form a firm tube which fits the finger. This will be the neck of the puppet. Now crumple a piece of newspaper into a ball of the size of the head you wish to make. Press this ball over and around the tube on your finger roughly shaping it to form the stuffing of the head.

Next, take a piece of plain paper (brown wrapping paper or tinted paper) and cover the crumpled newspaper in such a way that one side of the ball (where the face will be painted) is free of creases and folds. All the folds should come at the back and sides of the head. Tie this paper in place round the neck with a piece of string. Paint the face on the smooth side of the head with large black eyes and eyebrows (with very few lashes), red lips forming a large mouth and a few lines for the hair. Do not attempt to paint all the features, a few bold features are more effective.

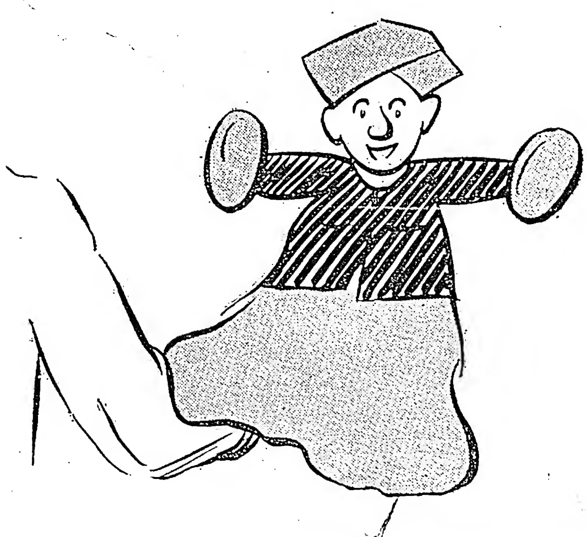
Now, take a piece of bright coloured cloth and sew it into a long tube. Put the head inside in such a way that the back of the head is towards the seam and the head is upside down. Tie the cloth on to the neck with a second piece of string. See that you tie firmly, but do not close the opening of the tube. Turn the cloth other side out, so as to expose the head, and cut slits for the thumb and middle finger. The thumb and middle finger should stick out sufficiently to look like arms.

The puppet is ready. Give it a name. If it is to be a man, put on a pugree or cap or paint a moustache, and if a woman, drape a sari over her head. There is no need to drape it over the body. Paint *bindi* on forehead or at parting of hair.

To make the puppet come to life, however, some practice would be needed. Work a puppet on each hand and see how much you can make each express by its gestures. To be successful, you have to identify yourself with the puppet, changing your voice as far as possible. Your right hand puppet should speak in a voice that is different from the left hand puppet. Also, take care to move only the puppet who is talking, and move only a puppet while he or she is talking.

PUPPET-PLAY

When you have had the necessary practice in animating puppets, the next thing would be to write a puppet play for your meeting. Choose the lesson

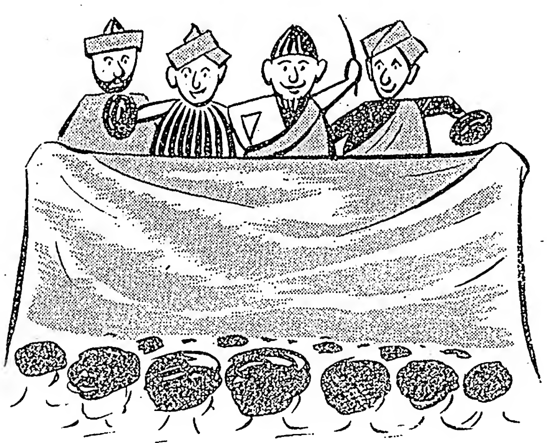


you wish to teach as its theme avoiding tendency to teach too much at one time. You will do well to illustrate the lesson by a story having dramatic value, with the lesson forming the crux of the most dramatic movement in the play—victory, loss, joy or sorrow.

An improvised stage made with a charpoy will serve your purpose. Turn the charpoy on its side, covering it with a curtain, bed sheet, blanket or any other suitable cloth, so that the frame of the charpoy forms the frame of a screen. The puppeteers should sit behind the screen. They should hold their arms up, so that the puppets appear above the screen and can be seen by the audience. The puppeteers themselves however should not be seen by the audience.

Choose distinctive characters for your play. For best effect, bring out their main characteristics, i.e., black must be pitch black and white, snow white. Usually, there are only two puppeteers, so only four characters can be on the stage at one time. Most people can only make two voices, so each can play one man and one woman or child at a time. When introducing a new character, make it quite clear in the dialogue so that everyone knows who this character is. It takes time to change puppets on one's hands, so allow time for this when introducing a fifth, sixth or any character after the fifth and sixth. These characters never change costume, so it is best to have only a few characters so as not to confuse the audience.

Your puppet play should be composed of short scenes, short speeches. The dialogue should be quick, with lots of action, the extent of action, of course, depending on the skill of the puppeteers. There should be no silent pauses.



A sprinkling of wit and humour even in the tragedies will make your play more interesting and help sustain the audience's interest. So will music and songs and poems, if they are based on familiar tunes and are not too long. They will also help drive the lesson home and help the audience to remember the lesson. Bring in everyday people and familiar situations to give a realistic touch to your play.

Last but not the least, the keynote of your performance should be to take the audience into your confidence and not to preach. Preaching is very likely to bore them.—*From the forthcoming publication "Extension Guide for the Village Worker".*

ISLAND COMMUNITIES TACKLE SALINE SOILS

Co-operative farming in a remote corner of Orissa

by

G.V. Chalam

FOR the last fifty years or more, a system of co-operative farming is being followed in a remote corner of Orissa State with singular success.

Co-operative effort has helped convert a saline and thick jungle land into a productive rice land in the numerous small islands scattered near Kujang, the confluence of the Mahanadi and the sea, about 60 miles from Cuttack.

These islands, each 2,000 to 3,000 acres in area, are thickly wooded with mangrove vegetation, and their soil has become saline due to a number of creeks surrounding them and flooding them with sea-water with every rising tidal wave. Salinity in the soil reaches such a pitch in summer that no drinking water may be available for miles around.

As such, no cultivation on these islands seemed possible, until about 50 years ago cultivators living in the neighbouring islands took lands on lease from their owners and set about reclaiming them for growing paddy. They however quite realized that this was no one-man's job, nor a day's work.

The stupendousness of the task ahead, therefore, stirred their co-operative instinct, and they were able to evolve for themselves a system of co-operative farming, which though primitive in appearance, has established firmly in these areas. The system has come to be known as 'Khanda Cultivation' and derives its name from groups or *khandas*, as they are locally called, in which the cultivators divide themselves for work.

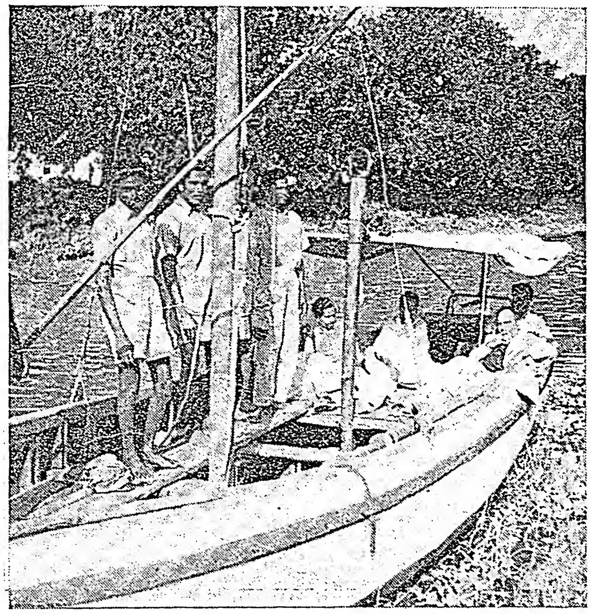
On each island, one, two or more groups may operate at one time, depending on its topographical conditions. But even then, they work jointly for carrying out certain operations, the most important among them being erecting a ring bund to prevent flooding of the island. A ring bund is usually five to six feet high, and, on some islands, as long as 10 miles.

ARDUOUS PROCESS

Each group undertakes to reclaim 100 to 150 acres. The process that follows is a long and enduring one, and it is not before about the tenth year that the cultivators may hope to obtain a harvest worth the name.

As a first step, the land is denuded of all its mangrove vegetation. The trees are not felled completely, but are cut up to stump level which may be two to three feet high. After removing all that is fit for timber or fuel, the rest is burnt.

Boats like this are the only means of communication between the home islands of cultivators and their place of work



Small plots measuring three to five acres with bunds two to three feet high are next made, and for the first year, only rain water is stored in them to leach out the salt in the land through subsoil drains.

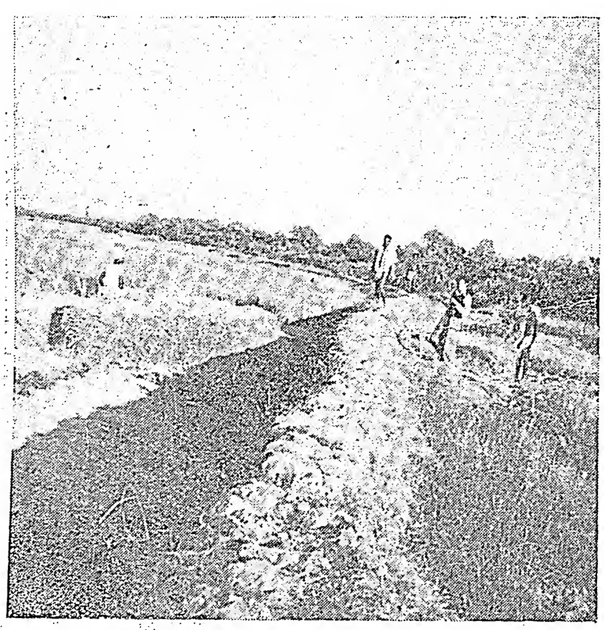
Actual cultivation starts in the second year only. Specially trained buffaloes are used for ploughing, as they have to move in a serpentine manner to avoid the numerous mangrove stumps and breathe roots which stand out like spikes on the ground.

The land is then thoroughly puddled and as much green leaf from *neem*, mango and tamarind as available, is added to it. For the first two or three years, paddy nurseries are raised by the cultivators in their own villages and the seedlings are brought to these islands for transplanting in country boats, their only means of conveyance.

First five years or so, the yields are very low, being three to seven maunds per acre. Storage of rain water in the plots is often continued all these years.

The stumps and breathe roots, deprived of their salt supply and on account of continuous ploughing, start decaying gradually and can be pulled out by simply tilting them. This is a sure sign that the process of reclamation is complete. About the tenth year or so, the yields generally rise up to 12 to 15 maunds per acre.

A typical ring bund separating the standing paddy crop (left) and mangrove vegetation in the background



Harvested paddy crop left for drying

The expenses of cultivation are met and the sharing of the produce is done on a simple 'unit' system, a unit comprising five or ten acres and known as *kani* or *bokhara*, as the case may be. Each unit-holder contributes one or two ploughs and a few workmen for carrying out the operations. A certain portion of the produce is also given by him towards a common pool designed to meet the wages of extra labourers engaged for operations like transplanting, weeding and harvesting. Land revenue is nominal and is borne by the unit-holder individually.

COMMUNITY SHEDS

The cultivators move to these islands with the break of the monsoon every year, that is, about the beginning of June. One or two long thatched sheds are constructed near the creek to house the workers. The creek serves as their main link with their home islands.

Each shed has a common kitchen where three meals a day are served to the workers. The kitchen is looked after by a hired cook who is paid from the common pool. Vegetables for the kitchen are grown in a small kitchen garden attached to each shed. The pastime usually adopted by the workers is fishing, and each *khanda* owns an exclusive fishing ground.

This community life continues up to January, by which time the harvesting and threshing of the crop are completed, and is climaxed with the return of the cultivators to their home islands in country boats laden with the golden grain—the fruit of their hard labour, and on the way the oarsmen often breaking into a chorus with the rythmic thud of their oars.

PLAN BEFORE YOU PLANT

by

S.L. Katyal

THE raising of an orchard is a science, an art and a business enterprise. But that is not all. It is also a way of life. It has a promise of a joyous, healthy and prosperous life.

An orchard is a long time investment; hence it deserves careful planning. Any mistakes committed in the selection of the site, soil, types and varieties of fruits in the initial stages may prove costly at the end and result in a substantial decline in profits.

In planning an orchard, the selection of the site deserves full consideration. It is always good to start a new orchard in a recognized fruit region. Because then you would surely have the benefit of the experience of the fruit growers of the locality and may be, you would be better able to sell your products through co-operative sale channels.

But if you are more resourceful and have enough money to invest, then you may establish an orchard in a locality where there are a few or no orchards existing. In such a locality you will have no competition and will be able to get a higher price for your produce.

Better select a site close to the market or a city, if that were possible. The site should be connected with a market by a road, river or rail. It should also be in a locality where the climate is favourable for fruit growing.

In the plains, most tropical and sub-tropical fruits like mango, citrus, papaya, guava, mulberry, dates, fig, *phalsa* and grapes can be grown successfully. In the hills, temperate fruits like apples, pear, walnut, peach, plum and cherry can be grown from an elevation of 1,500 to 7,500 feet. These fruits do not tolerate continuous heat, wetness or dryness and require a winter rest. Hills afford them the condition they want.

Coconut, banana, pineapple and cashewnut thrive best on the coast line.

SOIL

Remember, climate is more often a limiting factor in fruit growing than soil, but selecting the right type of soil is also of great importance. Always prefer a deep, well drained and fertile soil for growing fruits.

Different fruits like different types of soils. The pomegranate, guava and figs get along very well with sandy loams and shallow soils. Papaya and banana need good soils and plenty of water. The mango needs a deep, well drained and loamy soil.

For citrus cultivation, light sandy loams to heavy loamy soil are quite suitable. Grapes need a rich, well drained soil and a very dry ripening season.

For fruit raising, avoid soils which are highly alkaline, shallow or those with *kankar* or a hard pan or those which are water-logged. A good drainage is essential as trees do not thrive with water standing round roots.

Next to climate and soil, pay attention to water. The water source may be a well or a canal or for a small orchard, a tank. Without a good water supply, do not expect young trees to grow and develop fully nor full grown trees to bear good crops.

The other considerations which require attention are availability of cheap labour and quick means of transport from orchard to market.

When you have satisfied yourself that the site you have selected fulfils all these conditions, the next thing you have to do is to see that the levels of the land are graded so that the water from the source of supply can be taken to every part of the site. This needs to be done in the initial stage itself, as it may prove difficult to correct unsatisfactory levels at a later stage.

Soil operations should commence in time before the rains, let's say, January. The soil should be ploughed deep and left open. After the clods have crumbled due to the effect of the sun, plough the land again and harrow twice. Then sow a green manure crop like sannhemp. After about six weeks, flatten it and plough it in. When it has rotted, plough and harrow again.

PROPER FENCING

The orchard needs protection from cattle and other animals like goats, deer, wild pigs and monkeys. This can be done by fencing the site all round. Thorns and bushes can make temporary fences. Mud walls are frequently put up. Their efficiency can be bettered if *cactus* is planted on top of them. High brick walls are permanent and very effective, but are costly. Hedges of *mehandi*, *acacia*, *haranda*, *khatta*, *Inga dulcis*, *cactus* and *thor* can be successfully raised.

It is good to prepare a tentative plan of the orchard showing buildings, roads, irrigation channels and fruits to be grown in the different blocks.

An orchard is a pleasant site for putting up a dwelling. Other buildings needed are a store for implements and tools, a cattle shed and quarters for the workers. These buildings should be nearabout the road, and as far as possible, centrally located.

The main roads should be fairly wide, say, about 12 feet and so built as to make every plot accessible by them.

It is better to have all the water channels made pukka. If this is not possible, at least the main ones should be made pukka to prevent wastage of water.

A well laid-out orchard

Bhindi

A thick stand like this is necessary to obtain optimum yields from a summer crop

PUSA MAKHMALI,

A New Find In Lady's Fingers

by

H. B. Singh and S. M. Sikka

PUSA MAKHMALI is the name of the new variety of *bhindi* or lady's finger that gives an acre-yield of 200 to 250 maunds of six to eight inches long, straight, smooth and attractive green fruits.

This variety, selected from the West Bengal varieties tried at the Indian Agricultural Research Institute, New Delhi, has proved superior to all the indigenous as well as foreign varieties under Delhi conditions.

Bhindi or lady's finger is extensively grown all ov India, and its tender pods are greatly prized in Indi cookery. *Bhindi* varieties are distinguished by the growth habit, i.e., whether dwarf, medium or tal hairiness of pods and the number of ridges on pod: i.e., whether five-edged (*panch paihlu*) or eight-edge (*aath paihlu*).

The varieties producing five-edged, smooth fruits are generally cultivated during the summer season while the eight-edged smooth or hairy-podded varieties are mostly grown in the rainy season. *Pusa Makhmali*, though five-edged, can be grown both as a summer as well as a rainy season crop.

When sown for the summer crop, it fruits in about 50 days, while as a monsoon crop it takes about 10 days longer to become available for the first harvest. The fruiting in summer lasts for about two months, though harvests can also continue during the rains under favourable condition ; the rainy seasson crop usually supplies fruits rights up to the winter season.

PREPARATION OF LAND

This variety like all others would grow in any kind of soil, but a friable, well-manured loam suits it best. Three to four ploughings are given and farm-yard manure at the rate of about 20 cartloads per acre is applied to prepare the field. The summer crop would require a heavier manuring than the rainy season crop. For realising good yields, ammonium

phate at the rate of 100 lb. per acre after fruiting as commenced may be given.

If sufficient farmyard manure is not available, a mixed fertilizer composed of 250 pounds of ammonium sulphate, 600 pounds of superphosphate and 150 pounds of sulphate of potash can be applied.

SOWING

In the parts of northern India having a fairly cool winter, the earliest sowing of *Pusa Makhmali* can be done towards the end of February, and may be continued till the middle of July. For the main summer crop, sowing should be completed within the month of March. For the rainy season crop, it is preferable to sow well in advance of the break of the monsoon, so that the plants are well grown before the yellow vein mosaic infection starts. Sowing should, therefore, be completed about the middle of June or even earlier.

Late sowings after the middle of July usually do not give a good crop. In the warmer southern and western parts, though sowing is possible over a greater part of the year, the main sowings correspond to sowings in northern parts with the difference that sowings can be commenced earlier, i.e., during the month of January.

For the summer crop, which is sown thick, the seed is either broadcast in well prepared flat beds, which are afterwards given a shallow ploughing and beamed lightly, or drilled in shallow furrows. If sown in furrows, the optimum spacing that may be given between rows is nine inches with plants three inches apart. Close spacing is necessary in the summer crop, because *bhindi* plants in that season do not make as rank a growth as that of the rainy season crop. With this spacing, about 20 seers of seed would be required to sow an acre.

Pusa Makhmali

Where irrigation facilities are limited, the seed can be dibbled on both sides of raised beds, 1½ to 2 feet wide and separated by one foot wide furrows for irrigation. Plants in the rows should be three inches apart. The seed-rate for this system of planting is about 8 to 10 seers per acre.

For the rainy season crop, the seeds should be sown in rows 2 to 2½ feet apart, planting four seeds in each hill at a spacing of one foot. This would require about five seers of seed to plant an acre. When the young plants show four leaves, they should be thinned out and only one healthy, well grown plant may be kept in each hole.

AFTER-CARE

The summer crop should be irrigated once a week during March-April and every 4th and 5th day during the hot and dry periods of the months of May and June. The rainy season crop, if sown before the monsoon has started, would need one or two irrigations in the pre-monsoon period and fortnightly irrigations after the rains have stopped. Three or four weedings of the crop would be necessary.

HARVESTING

Bhindi pods have to be picked when they are tender and just half grown; overgrown pods become tough and unmarketable. The pod is usually in the best condition for picking at the four-day stage, as after six days' development, it begins to become tough. Picking of pods early after their formation extends the fruiting season.

SEED PRODUCTION

Since *bhindi* varieties grown alongside can outcross considerably, it is necessary to take precautions to maintain the purity of a variety. For large scale seed production, the best way is to grow only one variety in any one locality, or if more than one variety is desired, to isolate them in fields a few hundred yards apart. For small scale seed production, it is preferable to set apart a portion of the crop for seed, rather than leave one or two fruits on individual plants.

In the northern parts of the country, it is more profitable to grow the seed crop during the rainy season, as it yields more seed than the summer crop does. Moreover, the sale of green pods of the summer crop is more profitable. There is no difference in the germination or performance of the crop raised from seed obtained from the summer or the rainy season crop. An average seed crop of *Pusa Makhmali* would produce 4 to 4½ maunds of clean seed per acre. Yield of seed from individual plants varies from half to one ounce.

PESTS AND DISEASES

The most serious disease of *bhindi*, especially of the rainy season crop, is the virus disease known as yellow vein mosaic, which turns all parts of the plant including the fruits yellow. The virus infected plants should be pulled out and buried as soon as detected, so that the disease does not spread to the healthy plants.

Amongst the insect pests, the cotton jassids, cotton bollworm and the red mite do considerable damage to the *bhindi* crop. The cotton jassids, which suck the sap and crumple the leaves, appear mainly on the rainy season crop. Two sprayings with 0.2 per cent D.D.T. (wettable powder) would help in controlling the jassids.

The cotton bollworms bore the growing shoots and the young fruits. Hand-picking of the affected shoots and fruits is recommended for effecting partial control of the borer.

The red mite often appear in large numbers especially on leaves and suck the sap resulting in the drying up of leaves. Mite can be controlled by dusting the affected crop in the morning with sulphur or with a mixture of sulphur and lime in the ratio of 1 : 5.

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This one.
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Don't Spare the Vegetables

RIGHT in your kitchen garden are some beauty foods. You may be aware of them or you may not be, but farm wives all the world over are increasingly making use of these for better health and for better appearance.

These foods are the vegetables. Properly used they can give you a clear soft skin and bright eyes better than any cosmetics.

All housewives are fully conversant with the various vegetables grown for the kitchen, and various ways of preparing these vegetables to appeal to the eye and the tongue, but the stress today is more and more on the consumption of raw vegetables in the form of salads.

Vegetables, like fruits, do not yield much energy, but they are a good source of vitamins and mineral salts, vitamins like A and C and minerals like calcium, iron, phosphorus, sodium, chlorine and iodine. That is why vegetables and milk are called protective foods and are very important in the case of those who prefer a vegetarian diet. Vegetables also contain a roughage which stimulates the bowels.

Among vegetables, there are those that grow above the ground. These are rich in cellulose (the roughage) and A and C vitamins. When eaten raw, these improve the tone of the muscles, especially those of the bowels. Those that grow beneath ground supply a good amount of energy in addition to giving vitamins and mineral salts. Those that grow on vines, in addition to containing vitamins and minerals, contain starch and sugar in them. Peas and beans are rich in proteins also.

It is good to bear in mind that in the daily diet at least one vegetable from each of these groups may be included, so that what one group lacks may be supplied by the other.

An important caution to be taken in cooking vegetables is that a minimum quantity of water is added. This water, however, should not be thrown away after cooking as it will contain mineral salts brought out from the vegetables. Nor should vegetables be overcooked on a big fire. The greater the heat we apply, the greater is the loss of vitamins.

SALADS

It is important that at least some vegetables are eaten green and raw. Many do it in the form of what are called salads. A salad consists of raw vegetables dressed with salt, soil and vinegar and maybe with some condiments too. You can use a variety of vegetables for salads. The salad has wonderful powers of removing the tired feeling and giving vim and vigour to the consumer. It also builds up resistance to infection. A good salad is easily digestible and highly suitable for children.

In making salads, touch the plants as little as possible. Use the vegetables directly after picking or buying.

The vegetables used for preparing a salad should be washed with a dilute solution of potassium permanganate to prevent any infection, as they are eaten raw.

But if your family has not been used to salads or raw vegetables, you may have to be a little cautious in introducing the dish to them. The best thing would be to try the raw vegetables in small amounts as an extra dish with meat or fish in the form of shredded cabbage or some such way.

Vegetables can come in handy for preventing many of the deficiency diseases common in Indian households. Whenever skin diseases, night blindness and stunted growth in children are seen, such vegetables as cabbage, sweet potato, spinach, turnip leaves, pumpkin leaves, lettuce, peas, tomatoes, carrots and other green leaves should be included in the diet.

When a loss of appetite, constipation, lack of stamina, intestinal and nervous disorders are seen among the members of the family, spinach, turnip leaves, beans, cabbage, peas, lettuce, etc., should be eaten. When gums are diseased or decay is seen in the teeth or when there is a loss of appetite, one should take tomato, spinach, cabbage, cauliflower, peas, lettuce, potatoes, radish, turnip, onion, cucumber and other fresh vegetables. When delayed bone growth, defective teeth or rickets are seen in children, spinach, beans and potatoes must be increasingly used in their food.

HYDRAULIC RAM

I read somewhere about Hydraulic Rams being very useful. Can you tell me what Hydraulic Rams are and how they are put up ?—G.T.D.

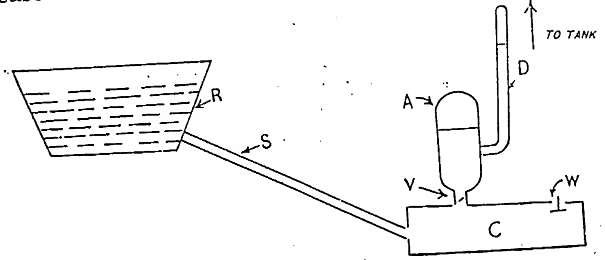
A Hydraulic Ram is an automatic pump by which a large quantity of water falling through a small height is utilized in lifting a small quantity of water to a greater height. No external power is required to work the Ram. Its working is mainly due to the inertia forces in a column of water under a head.

Water from a source 'R' as shown in the sketch commences to flow down the pipe 'S' to the Ram. It fills the chamber 'C'. This chamber is connected with two valves, viz., the valve 'V' which opens upwards only and the valve 'W' called the waste valve which opens downwards only. When water commences to fill the chamber 'C' the valve 'V' is closed and the valve 'W' opens. After filling the chamber the water flows through the valve 'W' to waste.

As the speed of the water in the pipe 'S' increases, the *dynamic pressure* on the valve 'W' increases until it ultimately becomes greater than the weight of the valve; the valve will then suddenly close.

The closing of the valve 'W' brings the water in the whole column suddenly to rest, causing an increase of pressure in the chamber 'C'.

This increase of pressure lifts the valve 'V' and water rises into the air chamber 'A', compressing the air in it. The increased air pressure forces the water into the delivery pipe 'D'. At that point, the water is deprived of its momentum. It loses its dynamic pressure on the valves 'V' and 'W'. The valve 'V' closes as before and the valve 'W' opens due to their weight as the dynamic pressure holding them is released.



Opening of the valve 'W' causes the flow from the reservoir to recommence; the cycle is then repeated. The automatic valves 'V' and 'W' may act by their weight or by a spring.

Hydraulic Rams are chiefly used on country estates and farms where large quantity of water under a low head is available, viz., a natural reservoir at the top of a hill or a stream running at a slightly higher level than the installed Ram.

The overall efficiency of the Hydraulic Ram is as large as 80 per cent in some cases. The Ram is susceptible to great ranges of efficiency. It has been possible to lift water to a height 50 times the height of the working fall.—*R.V.R.*

Indian Farming

VOL. IV MARCH 1955 No. 12

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

THE SOIL THAT WENT AWAY

MUCH light was thrown on the serious situation arising out of soil erosion on our cultivated fields, forests and pasture lands at the meeting of the Soil Conservation Society of India recently held in Patna.

A generation or two ago, the per-acre yield of *jowar* was ranging from 400 to 600 pounds. Recent crop-cutting experiments show that it now stands between 300 and 500 pounds. What is responsible for this decline in crop yield? All evidence points to erosion as being the chief cause of the lowering of productivity. Laboratory tests indicate that wherever erosion plays its mischief, the soil loses clay and organic matter, two of its important constituents needed for the retention of moisture and support of vegetation.

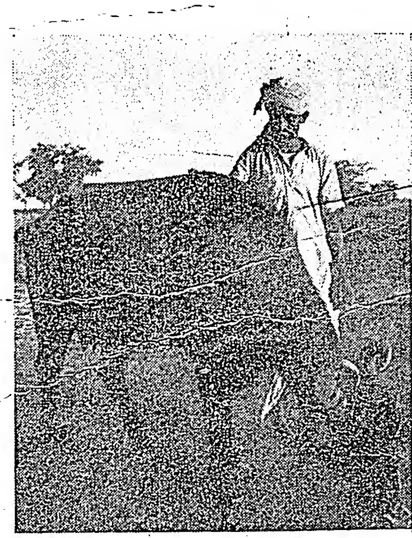
Erosion is slow, but sure. Soil scientists have been reporting that what was not so long ago termed a medium soil of 9 to 18 inches depth is today but a shallow soil of about nine inches depth. In some places, they contend, we have lost seven inches of rich fertile topsoil in a period of less than three decades. A sample survey conducted shows that crop growing is no longer a profitable enterprise in almost a third of the cultivated area in the Deccan plateau.

The situation, in brief, is serious enough to be taken note of by all farmers. Erosion has to be stopped before it is too late, and all eroded areas have to be rehabilitated. The soil that went away will not return. But the farmer must take all steps within his command to protect the valuable soil from further being lost.

There are many ways of controlling erosion suited to various climatic and topographical conditions. The State is extending all help to farmers in adopting these measures. Contour bunding of the fields and adopting such measures as strip cropping, contour planting and providing a soil cover are some of the measures largely recommended and which farmers can easily put into practice. More than anything else, a proper planning to put the land to its best use seems to be the first step towards soil protection. Tree planting and rotational grazing are two measures which should appeal to all farmers.

Such measures will not only conserve soil and, incidentally, water, but also help in raising the fertility of the land which at present in our country is very low. Incorporating soil conservation measures in the farming routine will not only be a means to more economic farming, but the farmer will also have the satisfaction of handing over to the next generation a much better farm than what it was when it came to him.

OUR COVER



Farmer Ram Din of Delhi is a dairyman too. Here he is out grazing one of his buffaloes. "Buffaloes need exercise to maintain good health," he says. And he looks to it personally that they get enough of it.

Farmers I Have Met

MAN WITH A NOSE FOR THE NEW

"MY experience tells me that for sure success in farming one must keep abreast of the progress made in this field. For that, one has to cultivate a 'nose for the new' and tap all possible sources for getting useful information."

Farmer Morarbhai Ukabhai Patel of village Pathri in Gandevi taluka—called the garden land of Surat district in Bombay State, expressed himself in these terms when I recently met him. Stickler-like devotion to methods handed down to them by their forefathers repelled him, he told me.

His innate desire to 'get out of the rut' had brought him in close contact with the officials of the local Agricultural Department "from whom I have learnt a great deal," he admitted. It was with their guidance that he had raised a crop of paddy by the Japanese method that gave him a per-acre yield of 5,516 pounds as compared with the local average of 1,600 pounds.

Morarbhai regularly visits the agricultural shows and exhibitions put up by the Department from time to time. "There you get all the information that you need to solve your agricultural problems besides learning many new things," he said. Occasionally, he also has a round of the neighbouring villages to observe what other successful farmers are doing, and is never late in importing whatever fascinates him or what he had not known before. He also subscribes regularly to an agricultural magazine published in Gujarati by the State Department of Agriculture.

This progressive outlook of Morarbhai has paid him rich dividends. Since he took up farming nearly 10 years ago, with the mantle of tending a large family forced on his shoulders on account of the sudden death of his father, he has added 20 *bighas* more to his ancestral farm, married off his four sisters, installed two oil engines, two pumping sets and one power-operated sugarcane crusher in his farm and still has about 4,000 rupees in cash with him.

"But, please don't go away with the idea that I am satisfied with money only. In fact, 4,000 is the ceiling that I have fixed for my savings. Every rupee above that sum goes back into my farm by way of some kind of improvement.

"What I cherish most," he put in modestly, as I was about to leave, "is a desire to become a farmer of distinction in the country." And I thought he was well on the way to its fulfilment the way he was pushing up his yields.—**H.K.S.**

Man of the Month

Shri Ram Krishna Singh

A THIRD TRY BRINGS FARMER AN ALL-INDIA HIGH

by

K. E. SANKARAN

WHEN I read in the morning papers that Shri Ram Krishna Singh of Barkatpur village in Bulandshahr district of Uttar Pradesh had won the first prize in the all-India competition in wheat growing and had qualified himself for the Krishi Pandit award for 1953-54, I was curious. What makes a Krishi Pandit? What did he do to annex this coveted honour?

These questions which I mentally noted were soon to be answered when I undertook the journey to Barkatpur in the company of Shri Krishna Gupta, District Agricultural Officer, Bulandshahr, and met the farmer on his farm. I was prepared to meet a hoary peasant who by dint of long experience of crop husbandry had raised a prize crop, but the one who welcomed us at the farm gate was big and burly, but a young farmer. I later learnt that he was only 32. So this was the man who had bagged the first prize for wheat in the country; the crop that had yielded 64 md. 11 sr. 7 ch. 4½ *tolas* per acre. A good record indeed!

"Ram Krishna Singh has been at this job of growing record crops for the last four years," said Krishna Gupta to me. "Yes," interposed the farmer, "the first time I tried was in 1950-51, when I got a yield of 48 maunds to the acre. This won for me the first prize in the *tehsil* competition. The second time I tried was in 1952-53 when they gave me the first prize of Rs. 5,000 in the State crop competition in wheat for returning a yield of 54 md. 17 sr. 4 ch. and this is my third and the best try, which has won for me the national prize."

On enquiring about the farmer and his experience in farming, I was told that Ram Krishna Singh comes off a *jat* family of hardworking farmers. He took over reigns from his father Kalyan Singh who is known to be a first rate and intelligent farmer with an immense

Farmer Ram Krishna Singh shows the simple seed drill which he used for sowing his prize wheat

He has tractors to do his cultivation for him, but bullock-power is still relied upon for some of the work on the farm

love for the land. Ram Krishna Singh took over management about 11 years ago from his father. Ever since he has had the improvement of the farm at heart and would not be satisfied with any farm operation unless he was there personally to take part in it and see that everything went according to the schedule he had in mind.

Looking round the thousand-*bigha* (165 acres) farm, it was clear to me that a good deal of attention and hard work had been put in, even in the minor aspects of farming.

Ram Krishna Singh told me that he had two tractors and other improved agricultural implements in addition to four pairs of bullocks, which was all that he needed for cultivating the farm.

OPERATION WHEAT

On enquiring about how he raised the prize wheat crop, Ram Krishna Singh said, "I offered 1½ acres of land for the competition. This is briefly what I did: about mid-June in 1953, soon after the summer crop had been harvested, I ploughed the land four times. The area was sown with sannhemp for green manure, using 1½ maunds of seed.

"A month later, I spread six maunds of bonemeal in the standing sann crop. Fifteen days later, I ploughed this crop in and allowed it to rot for a fortnight.

"During the next four months, fifteen more ploughings were given. Soon after, I spread six maunds of castor cake and 2½ maunds of superphosphate over the field. Then I ploughed the fields up twice again. This was how the field was prepared for the wheat crop."

"What kind of seed did you use?" I asked. "I used *Pb. 591*, an improved seed recommended by the State Agricultural Department. I purchased it from the Government seed depot and did the sowing on the last day of October. I had to use 1 md. 10 sr. of the wheat seed per acre."

"Did you treat the seed in any way before sowing?" I asked. "Oh yes, I forgot," said the farmer. "Before sowing, I treated the seed in a saturated solution of common salt. The seed was sown in rows seven to eight inches apart by means of a *desi* seed drill."

"What about the after-cultivation?" I asked.

"That consisted of a weeding and hoeing and earthing up the crop a month after sowing, and repeating the same process 20 days later. The crop was dusted with five per cent 'Agrosan G.N.'"

Replying to a question on irrigation, Ram Krishna Singh told me that the wheat crop was first irrigated in the second fortnight of December, about six weeks after sowing. During the following three months, he had given three more irrigations.

Towards the middle of April, 1954—10 months after the 'operation wheat' had commenced—the almost seven-feet tall wheat crop was harvested under Government supervision. The yield of over 64 maunds obtained per acre was a big yield when

Three generations of farmers. To Ram Krishna Singh's right is 80-year old Shri Kalyan Singh

taking the average of about 30 maunds per acre. "So far as the soil is concerned," said the Agricultural Officer, Shri Krishna Gupta, "it is a well drained loam. You can see that the farmer has levelled up the fields properly and is at pains to build up the fertility."

A GOOD PLAN

I could make out that the farmer had a good plan for his 125 acres. Sugarcane, maize and wheat were the principal crops, and the farmer was having a special interest in growing fruit trees for which he had set apart 65 acres. I found out that he was growing as many as 25 varieties of mangoes and six varieties of citrus, apart from jack fruit, papaya and others.

Ram Krishna Singh had the benefit of two tubewells set up by the Government to irrigate his farm. He had constructed a tubewell on his own and the installation of a fourth had already been sanctioned by the Government.

Ram Krishna Singh studied up to Matriculation, but his fancy for farming and his full-time devotion to it did not permit him to study further. Though a considerable lot of time of his is spent on the farm, he does not have a secluded life. He is the *Sarpanch* of the village panchayat and has to be a sort of friend, counsellor and guide to the villagers.

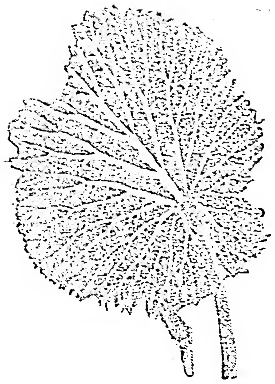
His 80-year old father, Kalyan Singh, is still young in spirit. Most of the guidance on agricultural matters comes from this experienced farmer. He told me, "I feel I am never too old to be useful, and somehow I cannot feel at rest unless I have my morning rounds in the farm, and only when I feel that everything goes in order and in time that I feel content." Both father and son feel it their duty to help co-farmers in the village. To this end, they are always in readiness to offer any help that anybody in the village requires from them. "Our ambition," says Kalyan Singh, "is to try co-operative farming in the village so that we may produce better with a joint and sincere effort."

Both father and son are always for progressive improvements in crop growing. "We always consult the Agricultural Officer whenever we have a problem, and much that we have achieved is through the valuable help and guidance of the Agricultural Department."

When I left I came away with the feeling that there was a great future before this farmer of the year. With his practical ways, hard work and immense love for farming, and the helpful attitude towards the villagers, we shall be soon hearing of greater things happen on this farm and in the neighbourhood.

For making idle land yield food and keeping jobless men and women busy

MAKHANA is grown in marshy land



Makhana *leaf. An immature fruit is seen left of the leaf stalk*

by

M.P. Singh and M.D. Jha

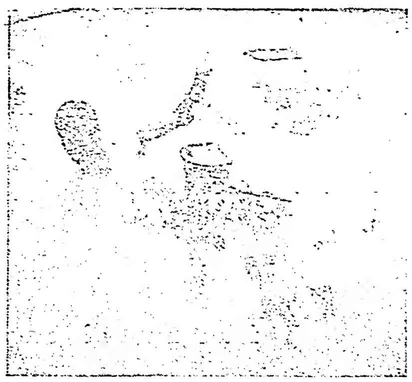
FOR reclaiming waterlogged lands where no other kind of cultivation is possible, a new plant called *makhana* (*Euryale indica*) offers great possibilities. Studies on *makhana*, which is largely cultivated in the *chap* lands of Darbhanga, Purnea and Saharsa districts of Bihar State, were recently carried out at the Agricultural Station, Sabour. These studies point to the possibility of introducing the plant also in other states of the country, particularly Uttar Pradesh, W. Bengal and the South, where sufficient waste lands of the type of *chap* lands are found.

The cultivation of this plant in Bihar is generally done by a particular community called the *gorhis*, who obtain *chap* lands which remain under water throughout the year, on lease from their owners. The lands are allotted through open auction, the settlement for an acre varying between Rs. 350 and 400. Sometimes, the bid for a particular piece of land may go up to Rs. 1,000 if it offers prospects of a luxuriant crop.

The sowing of *makhana* commences from the last week of November and continues up to December. A seed-rate of 35 to 40 seers is sufficient to sow an acre in the first year. In subsequent years, the crop is self-sown and resowing is not necessary. Flowering starts in three to four months' time, and after about a month and a half, seed-setting is complete. In another month, the seeds mature completely and are ready for being harvested.

Harvesting is done in the months of July and August. *Gorhis* go about in boats in the ponds cultivated with *makhana*, diving and collecting the seeds that have fallen to the bottom in small bags called *kouchis*. Since all the seeds cannot be collected, those remaining over the bed of the pond germinate in the ensuing cold season and give another crop in the next year. The yield of *makhana* thus obtained varies from 40 to 60 maunds per acre.

The *makhana* seeds are then prepared for the market. This is generally done by the *gorhi* women who work on contract basis getting 25 per cent of the produce as their share. The seeds are first graded into three sizes, viz., bold, medium and small. They are then made into puffs by parching in hot sand. The seedcoats that remain attached to the puffs are removed



Collecting seed from the bed of the pond

afterwards with the hand before the commodity is put out for sale. The percentage of *makhana* of commerce to the seed is 33.

Makhana fetches a good price of Rupees five to seven a seer in the market on account of the multiple duties that it performs. It is valued as an article of food and is generally taken in the form of puffs or *lava*. When roasted with a little ghee, these puffs make a good savoury, and when cooked in milk they are an ideal convalescent food, being easily digestible. By the orthodox section of the Hindu society, *makhana* is also used in the sacred thread ceremony, in marriages and also in the last rites of a person.

Preparing makhana *for consumption*

SELLING THROUGH 'REGULATED' MARKETS

is a habit with South Arcot farmers

by

K.V. Natesan and K.S. Menon

SELLING through 'regulated' markets seems to have captured the imagination of the South Arcot farmers in Madras State. The markets, first introduced in 1940 under the Madras Commercial Crops Market Act, handled 41,330 tons of groundnuts in 1953, which is no less than 91.5 per cent of the total produce offered for sale in the District.

There are at present eight such markets operating in the District at the important assembling centres of Tindivanam, Villupuram, Tirukoilur, Cuddalore O.T., Vridhachalam, Ulundurpet, Panruti and Chinnasalem. The working of these markets is supervised by a 12-man South Arcot Market Committee constituted under the above Act.

The District accounts for nearly 20 per cent of the total groundnut area in the State, the annual production of groundnut kernels from both the irrigated (summer) as well as rainfed (winter) crops being estimated at 15 lakh bags or 1,05,000 tons. Out of this total production of about a lakh tons, 15,000 to 20,000 tons are kept for seed purposes and local consumption, and the rest is offered for sale in the market. To this, about 20,000 tons are added from the neighbouring districts of North Arcot, Salem, Tiruchirapalli and Chingleput for marketing and export.

THE BACKGROUND

The cultivators in this part of the State are as a class very poor when compared with those in the other districts. In the past, they were entirely dependent on the middlemen for the disposal of their produce. These traders took full advantage of the ignorance and helplessness of the cultivators by advancing them loans, which they badly needed for meeting cultivation expenses, and even expenses on social ceremonies, and compelling them to pledge their produce against such loans. The long chain of trade interests that the poor cultivator had to put up with comprised the village trader and petty shopkeeper, country *chekku* owner, oil-miller, speculator, middleman, merchant and the exporter.

The other circumstances that necessitated regulation and reform in the buying and selling of groundnut may be briefly enumerated as: the use of volume measures by village traders and petty shopkeepers, use of unstamped French weights and fraudulent weighment of the produce in the market, non-payment to the farmers on the spot for the produce purchased, the monopoly enjoyed by exporters who virtually ruled the market, unauthorised deductions such as for moisture, refraction, charity, brokerage, commission, charges for weighment, and, above all, the absence of any agency to keep these malpractices in check.

The cumulative effect of all these was that the cultivator found himself unable to realize the full value for his produce. It has been estimated that before the introduction of regulated markets, the unauthorised deductions only amounted to a rupee per bag of about two maunds. But in the absence of any alternative arrangements which could be called satisfactory, the cultivator was forced to go to the petty village shopkeeper; and even if he managed to avoid him somehow, there was the middleman in the market ready to deprive him of his due price by fair means or foul. In addition, he did not have the facilities to store the shelled produce, the form acceptable to exporters.

Even when regulated markets had started functioning, the traders adopted backdoor methods to prevail upon their customary sellers to desist from going to these markets. This they did by offering them loans, gunnies to bring the produce to the market, tips for midday meals and such other temptations. But once the benefits of these markets were made known to the cultivators and the advantages of selling through these markets became apparent—thanks to the systematic and effective propaganda carried out by the staff of the Committee—the cultivators were attracted to these markets in large numbers.

The regulated markets have as their aim ensuring a fair price to the producer for his produce through:

getting them competitive prices by the system of 'closed bid' auction, which is the keynote of these markets, free and correct weighment under the supervision of the staff appointed by the Committee for this purpose, prompt payment, prohibition of free samples and unauthorised deductions and provision of temporary storage facilities to cultivators in the Committee's godowns.

'CLOSED BID' AUCTION

The system of 'closed bid' auction has been practised in the regulated markets since the first market was started at Tindivanam in 1940. As soon as the produce is brought for sale here, each individual bag is allotted a lot number. Lots which require sieving are sieved. The entire produce of a lot is then mixed and rebagged in the Committee's B. Twill gunnies.

The weighment is then done by the *mazdoors* who as their head have a licensed weighman. The weight is recorded by a yard *mistry* in the employ of the Committee, who is generally an educated person, in a weighment *chitta* bearing a machine number. Each *chitta* is in triplicate and of different colours. The sellers sign the *chitta* immediately the weight is recorded on it.

The packed goods with their lot numbers are then exhibited for sale in the transaction sheds of the Committee in a properly arranged manner. Daily one, two or three bids are usually conducted according to the volume of arrivals.

The first bid is normally conducted at 10 or 10.30 a.m. The bidders begin to pour in in the market by 8-30 or 9 a.m. After examining each lot they offer their prices for them in special bid chits supplied by the Committee. These bid chits are deposited in a sealed box which is kept in the Superintendent's office. A priority list is also put up near the box where each bidder has to sign his name to know his priority number.

At the exact time for closing the auction, a bell is rung and the bid chits are taken out of the box to compare the prices quoted by different bidders for each lot. The lots are then declared to the highest bidders after getting the consent of the sellers. In case of a tie between more than one bidder for the highest bid for the same lot, the bidder who tendered his price earlier is given the lot.

After the bids have been declared and the sellers' acceptance taken, the weighment *chittas* are completed by noting on them the buyer's name, price and value of the produce sold. Two copies of the *chitta* are handed over to the seller. The buyer takes the original copy and after checking the price and amount due to the seller and taking the seller's acquittance, pays the value to the seller. The sellers receive payment either on the spot or at the buyer's office if it is close by.

The bags are then delivered to the buyers. Handling charges and levy are collected from the buyers, and if any lot remains unsold, the weighment charge is collected from the seller. The amount so collected is paid by the Committee to the *mazdoors* engaged for handling the produce.

This system assures a fair deal to the buyers as well as the sellers, for the Committee looks after the interests of both by avoiding unhealthy competition between them which is rather accentuated in case of an open auction. Moreover, compared with the open 'crying' system, it is a quick and time-saving device. In the 'crying' system, it would take at least two to three minutes per lot to dispose it of. And, when in the busy season there are 800 to 1,000 lots to be auctioned, it may not be possible to complete the day's transactions. This system is also devoid of violent fluctuations and excitement so characteristic of the 'crying' system.

STANDARDISED WEIGHTS

As a result of the working of these markets, conditions of trade in private premises have also shown a tendency to improve. The traders in the assembling centres have stopped making unauthorised deductions. In all licensed premises, the weighment is done only with weights standardised by the Committee at 177 pounds net per bag and 531 pounds per candy. The weights and scales are subject to inspection by the Secretary or any other employee of the Committee not below the rank of Supervisor.

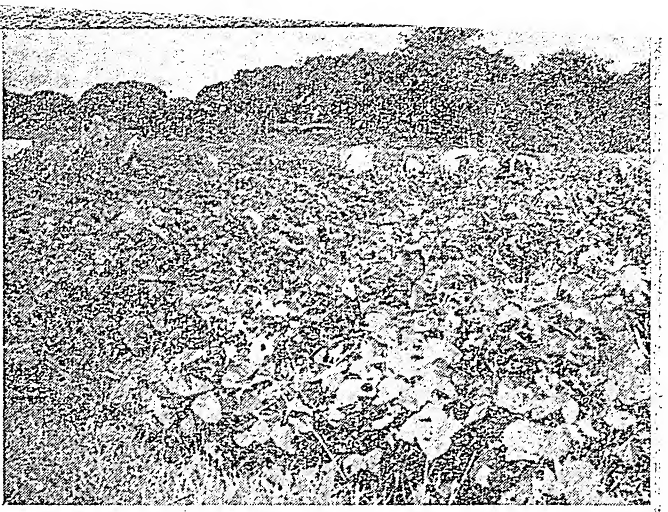
For the purpose of checking, each market is provided with a set of Master Weights which are checked and stamped every year with the help of a set of highly sensitive balance and brass weights kept in the custody of the Secretary at the headquarters. The private traders are advised to take their weights annually to the markets for checking and stamping by the Secretary. On an average, 2,500 weights are stamped every year and possessors of unauthorised and unstamped weights in licensed markets are liable to be prosecuted.

OTHER ACTIVITIES

Besides regulating buying and selling of groundnuts, the Committee has recently taken up the function of determining factors responsible for poorness of quality of the groundnuts marketed, locating sectors which contribute to this and fixing local grade standards. An attempt is also made to study the various kinds of kernels by drawing random samples from the lots received for auction. Results are analysed and tabulated and submitted to the State Marketing Officer, Madras, in the form of fortnightly reports.

(*Continued on page 32*)

Madhya Bharat's new pulse strains yield more



Early green gram—Krishna 11

by

S.M. Wakankar, P.S. Sangwan and Y.W. Mungi

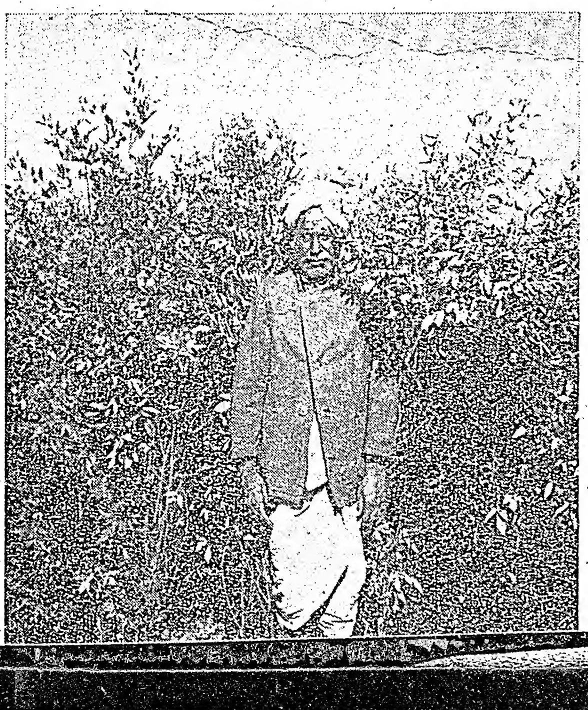
PULSE-YIELDS in Madhya Bharat can be stepped up, in some cases up to 60 per cent, by sowing the new strains evolved by the State Department of Agriculture.

Pulses occupy a significant place in the agricultural economy of Madhya Bharat, as nearly 2,200,000 acres are devoted to these leguminous crops. Of this area, about 1,400,000 acres are under gram, 290,000 acres under *arhar* and 510,000 acres under other pulses, notably *mung* and *urid*.

Improved strains have been evolved for each of these pulses under a scheme financed by the Indian Council of Agricultural Research.

The work of evolving these new strains which lasted for a period of about seven years (1945 to 1952) and dealt with almost all the important pulses grown in the State, was carried out at two centres, viz., Gwalior and Ujjain, representing the Indo-Gangetic alluvial tract of northern Madhya Bharat and the Malwa plateau of southern Madhya Bharat, respectively.

A bumper crop of pigeon peas—Gwalior 3



The following are the successful strains recommended for growing:

GREEN GRAM (*PHASEOLUS AUREUS*)

Krishna 11. Isolated from the material received from Madras State, this is an early ripening strain, taking about 65 days to mature. The seeds of this variety are bold and light green in colour, the per-acre yield averaging 250 pounds which is 12 per cent more than that of the local varieties grown by farmers.

Two pickings of the crop would be required to obtain the full yield. It is an ideal strain for double cropping with wheat, and can also be used for green manuring. This variety is particularly suited for the three northern districts of Bhind, Morena and Gird, but does not do well in the Malwa region.

Gwalior 3. A selection from the Bhind district of northern Madhya Bharat, *Gwalior 3* is a late maturing variety with deep green seeds, taking about 110 days to become available for picking. The average yield per acre is 300 pounds which is 14 per cent more than that of the local variety. It is suitable for growing in the northern districts of the State.

Ujjain 16. It is a selection from Bhilsa and is suitable for growing in the southern districts, particularly the Malwa plateau. It is a vigorous growing, late maturing strain with small grains, taking about 125 days to become available for picking. The seeds are deep green in colour, the average per-acre yield being 375 pounds which is 45 per cent more than that of the local variety.

BLACK GRAM (*PHASEOLUS MUNGO*)

Gwalior 2. It is a selection from Morena and is suitable for growing in the northern districts. It is a late maturing strain, taking about 110 days to mature, with seeds smaller than those of *Gwalior 18.* The seeds are black in colour, the average yield per acre being 425 pounds which is 55 per cent more than that of the local variety.

Gwalior 18. It is a late maturing vigorous bold-seeded variety selected from the Khachrod tehsil of southern Madhya Bharat. It takes about 110 days to mature and is suitable for the northern districts. The seeds are black in colour, the average per-acre yield being 450 pounds which is 60 per cent more than that of the local variety.

Ujjain 4. It is a selection from the Jora tehsil. It is a heavy yielding bold-seeded variety early in maturity, taking about 90 days to ripen. The seeds are dull black in colour, the average per-acre yield being 400 pounds which is 40 per cent more than that of the local variety.

Under favourable seasonal conditions, it permits a second crop of wheat or gram after a normal crop of black gram. It is particularly suitable for the Malwa plateau.

Ujjain Green 15. It is a late maturing strain selected from Bhilsa, taking 130 days to ripen. The seeds of this variety are bold, dull green in colour and attractive to look at. The yield per acre is 360 pounds which is 36 per cent more than that of the local variety. The variety is suitable for growing in the Malwa plateau.

PIGEON PEA (*CAJANUS CAJAN*)

Gwalior 3. It is a late maturing vigorous growing strain selected from the Ambah tehsil of northern Madhya Bharat. It has bold grains of fawn colour and takes about 240 days to mature. The average yield per acre is 1,000 pounds which is 25 per cent more than that of the local variety. The variety is suitable for the northern districts.

Ujjain 7. It is a selection from Ujjain and is suitable for the Malwa plateau. It is an early maturing strain with bold seeds and takes about 170 days to ripen. The grains are of a deep reddish brown colour, the average yield per-acre being 560 pounds which is 30 per cent more than that of the local variety.

GRAM (*CICER ARIETINUM*)

Gwalior 2. It is a late maturing strain of gram selected from Gwalior. It has bold grains of a reddish brown colour and is vigorous in growth, giving heavy yields on light soils. It takes about 125 days to mature and is suitable for growing in the northern districts of Madhya Bharat. The average yield per acre is 900 pounds which is 30 per cent more than that of the local variety.

Gwalior 3. It is a late maturing strain selected from Bijaypur. It takes about 125 days to mature. It gives good yields on light soils. The seeds are small and brownish black in colour. The average yield per acre is 800 pounds which is 18 per cent more than that of the local variety. This variety is suitable for growing in northern Madhya Bharat.

Ujjain Pink 2. It is a selection from the Bhilsa district. The seeds are light pink in colour and attractive to look at. This gram is in great demand for

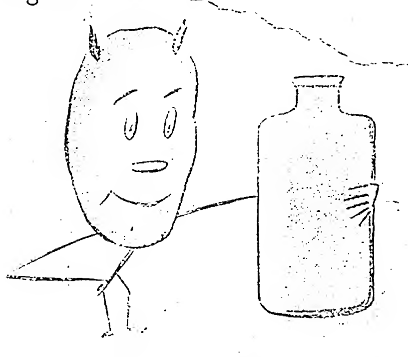
(*Continued on page 32*)

WHAT'S NEW IN FARMING

DORMANCY IN POTATOES

THE potato tuber remains dormant for two or more months after harvest. It fails to sprout during this period even if the conditions for sprouting are favourable. This is an advantage because freshly harvested potatoes can be stored for some time without any loss in quantity or quality. But this is a disadvantage also because freshly harvested potatoes cannot be planted immediately without running the risk of poor and delayed germination, resulting in gaps and poor yield.

Because of this dormancy period, seed obtained from the hills in September-October cannot be used for the main planting done in the plains in October-November. It has, therefore, to be planted as a second crop in December-January. The dormancy is also a disadvantage when successive potato crops are to be taken in a year as in the Nilgiris.



Experiments conducted at the Central Potato Research Institute at Patna have shown that cutting seed tubers and soaking the cut-pieces in one per cent solution of thiourea for one hour immediately before planting, is a safe and successful method of inducing rapid sprouting of tubers before the skin has hardened. The method is simple and can easily be adopted by farmers. One and a half pounds of thiourea costing about ten rupees, are enough for treating about 15 maunds of seed tubers, which means at a cost of about ten rupees about an acre can be treated.

In one trial, fresh tubers from the December harvest were treated with thiourea and planted the same day. The germination of the treated tubers started even a fortnight after planting and was completed in another two weeks. The untreated tubers, planted at the same time, did not germinate at all even after three months.

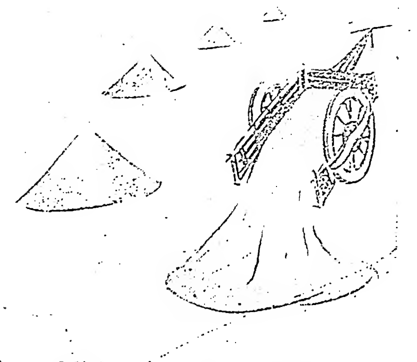
This treatment may be tried with success wherever dormant tubers have to be used as seed.

GREEN-LEAF MANURE

GREEN-LEAF manure studies in Madras indicate that any green-leaf manure generally is as efficient as ammonium sulphate on equal nitrogen basis. The organic matter of the green leaves has been found to have a good effect on soil tilth and structure and hasten the chemical changes taking place in the soil, and also supply plant nutrients. As such, in any manurial schedule for rice, a judicious combination of ammonium sulphate and green leaf would appear to be ideal.

PRESS MUD AS MANURE

PRESS MUD (press cake) is a by-product of the sugar industry. It contains valuable nitrogen and organic matter. It also contains a good quantity of phosphates. Press mud can be a very good manure for sugarcane. Recently, some demonstrations were conducted in Madras State and its advantages, specially to sandy soils, were shown to cane farmers. Plots receiving a basal dressing of 10 tons of press mud per acre gave an average increased yield of 18.44 per cent of cane per acre over plots which received no such basal dressing. In these plots, the usual top-dressing with concentrates was done



in addition to the application of press mud. Farmers living nearabout sugar factories should find in press mud a valuable means of improving soil fertility as well as getting better cane yield.

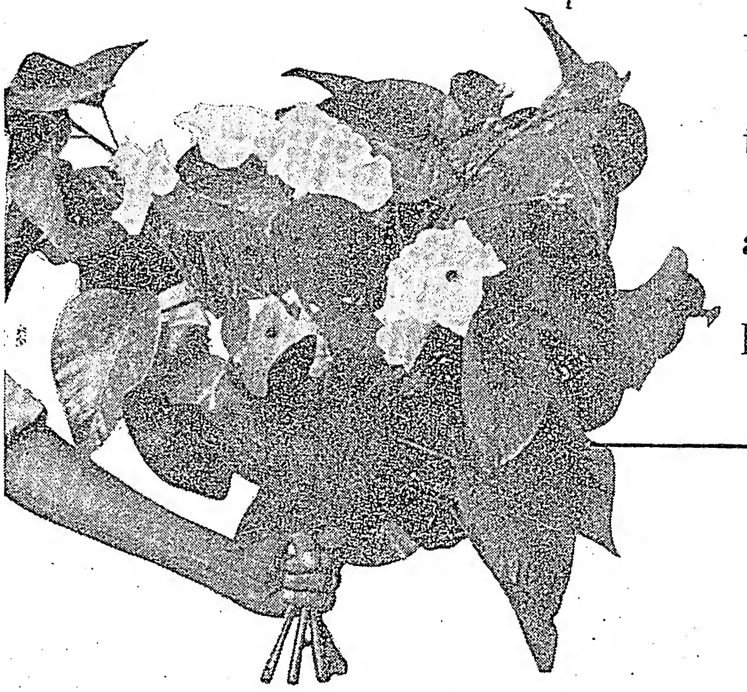
BLAST ON PADDY

BLAST can be a serious disease on rice wherever the crop is grown. Though one sure way of controlling the disease is to grow resistant varieties, the disease can be checked from spreading and damaging the crop by following a few simple measures.

The first precaution to take is to treat the seed for sowing with 'Agrosan G.N.' at five ounces per 112 pounds of seed. In addition, in the nursery stage when seedlings are about two weeks old, spray them with 3-3-50 Bordeaux mixture. An acre will take about 30 gallons of the mixture. A month after transplanting, a second spray of 5-5-50 of Bordeaux mixture should be sprayed. One more spraying can be done in case the disease persists. It is also better to spray grasses on bunds as well as the crop in the neighbourhood of the affected crops.

Burning of straw and stubbles of diseased crop is recommended to prevent disease spores surviving and spreading the disease.

Ipomoea carnea



turns out to be an ideal border green manure plant

by

B. W. X. Ponnaiya, L. Anavaradham
and
L. Sivagnanam

AFTER a long and patient search, the Madras Department of Agriculture has hit upon a plant eminently suited for raising as a border green manure crop on rainfed lands in the State, *Ipomoea carnea*. So far largely known as a horticultural plant, it fulfils all the conditions of an ideal border green manure crop, namely, drought resistance, production of large quantities of green matter, least root effect and no tendency to become a weed.

Extensive studies of South Indian soils have shown that they are highly deficient in organic matter. They also lack adequate quantities of nitrogen, phosphorus and potash. A good base of organic matter, however, is absolutely necessary for efficient acting of nitrogen, phosphorus and potash in case these are added to the soil in the form of salts. In a hot country like India, organic matter in the soil gets burnt up quickly calling for its constant replacement.

The Department has been advocating the growing of green manures on a field scale and ploughing-in of the resultant crop. This method of cultivation has become popular only in places where it does not affect the raising of another grain or money crop during that season. In some places, it may be possible to collect green leaves from the hills and *porombokes* (waste lands), have them composted and added to the soil. Even in these places a time will come when it may not be possible to get enough green matter when every farmer gets 'green-manure-minded'.

The Department, therefore, has been making efforts to find out a plant which would provide the farmer with enough green matter which can be applied direct or in the form of compost without making him to lose a crop. As a result of these experiments, the annual *Sesbania speciosa* and the perennial *Glyricidia maculata* have been found suitable as border crops for the wet lands as well as garden lands.

A wide survey of the Madurai, Ramanathapuram and Tirunelveli districts, especially the *porombokes* (waste lands), was also made with a view to discovering a suitable green manure crop for the rainfed lands. It was thought that only two species of plants, viz., *Cassia auriculata* and *Jetropa* species may have a chance. But later on, *Ipomoea carnea* was also included in the list. Hence, these three crops were tried as border crops during 1951-52 in the rainfed black soils.

The seeds of *Cassia auriculata* and *Jetropa* species were dibbled along the borders. Since *Ipomoea* does not produce seeds, cuttings were planted. In *Cassia auriculata*, the germination was poor but the plants persisted tenaciously and withstood heavy prunings. But it had a very slow growth and gave only woody green matter which was difficult to decompose. *Jetropa* species established itself well. It gave succulent

green matter, but did not survive drastic pruning. It also tended to become a weed, as it produced large quantities of seeds capable of quick germination. So, this plant was also rejected as unsuitable.

IPOMOEA SUCCEEDS

Ipomoea carnea, on the other hand, gave unexpectedly good results during the first year of planting, viz., 1951-52. Even though the year was droughty, 90 per cent of the cuttings struck root, the plants tided over the drought and gave heavy cuttings with the advent of fresh showers. It was also found to tolerate drastic pruning. Besides, the green matter obtained was succulent. The plants are known to be free from pests and diseases. They did not produce much root effect and were able to live for several years.

Trials showed that cuttings less than a year old, but not too tender, were the best for propagation and that the cuttings stored for 10 days gave 22 per cent establishment, indicating its ability to withstand transport over long distances.

Since the cuttings were succulent, it was found that it composted easily within two to three months time. When it was covered with tank silt for decomposition, the axillary buds of the topmost layer of twigs grew over the silt, indicating the tenacity of the plant and its ability to survive even trying conditions. It was also found to withstand the most drastic pruning. Finally, it was found that it did not become a weed, as it neither produced seed nor it had a tendency to root at nodes. This made the plant highly suitable as a border crop for rainfed black soils.

PLENTY OF GREEN MATTER

The entire area of the black soil block of 106 acres has been planted with this border crop from 1953 onwards, and within the past two years, a border crop of the length of 7 miles 6 furlongs has been established. A well established border crop two years old and one mile in length was found to give 75,000 pounds of green matter in one year, obtained in six cuttings. With this as the measure, it is expected that the entire border crop of the black soil area would give six lakh pounds or 270 tons of green matter during 1954-55, when all the plants attain an age of two years. Working at the dose of 5,000 pounds of green matter per acre, the 106-acre black soil area requires only 270 tons of green matter per year. Thus the production is self-sufficient.

In garden lands also, *Ipomoea carnea* comes up well. As a border crop, it has also been found to adapt itself well along drainage channels. It gives nearly double the yield of that of the rainfed crops as a border crop. Under irrigated conditions, a crop one furlong in length gave a total pruning of 19,000 pounds of green matter in a year.

The rainfed black soils of Koilpatti have been found to respond to the addition of nitrogenous manure in the form of groundnut cake or ammonium sulphate. An application of nitrogen at 40 pounds nitrogen level has been found to give an increased yield in cotton by 37 per cent, and has also been found to have a residual effect on the succeeding millet crops of *cumbu* (*bajri*) and *irungu cholam* (*jowar*) by nearly 20 per cent. By a mere addition of compost obtained from 5,000 pounds of organic matter to an acre, it has also been found that yields of the above mentioned major crops were increased by 10 per cent. Thus the fertility of the entire dry land block gets increased by nearly 10 per cent without the necessity of purchasing extra manure. By using this organic matter, ammonium sulphate can be advantageously used instead of groundnut cake which also saves the cost of manuring.

Non-production of seeds by *Ipomoea*, no doubt, hinders its rapid spread, but has a great advantage in that the plant is prevented from becoming a weed. *Ipomoea* flowers profusely and its large attractive flowers lend colour to the farm where it is grown.

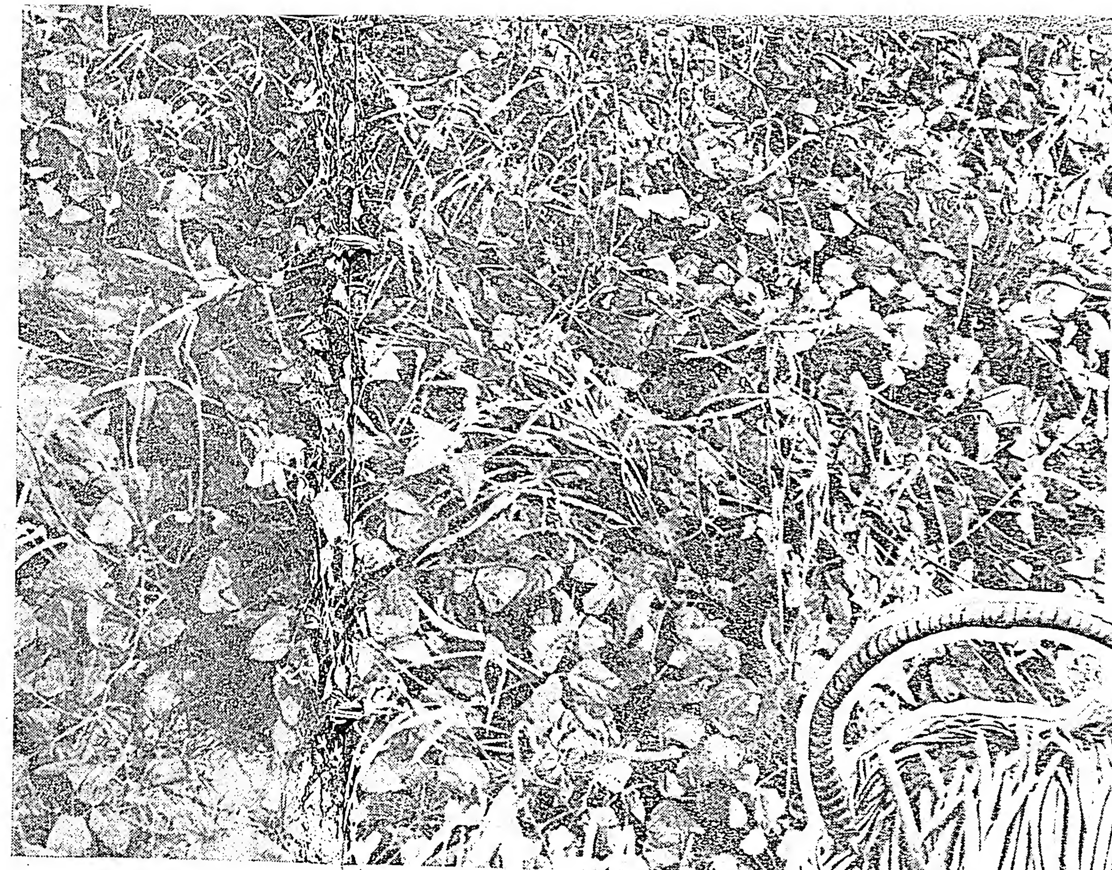
COWPEAS THAT DO BETTER

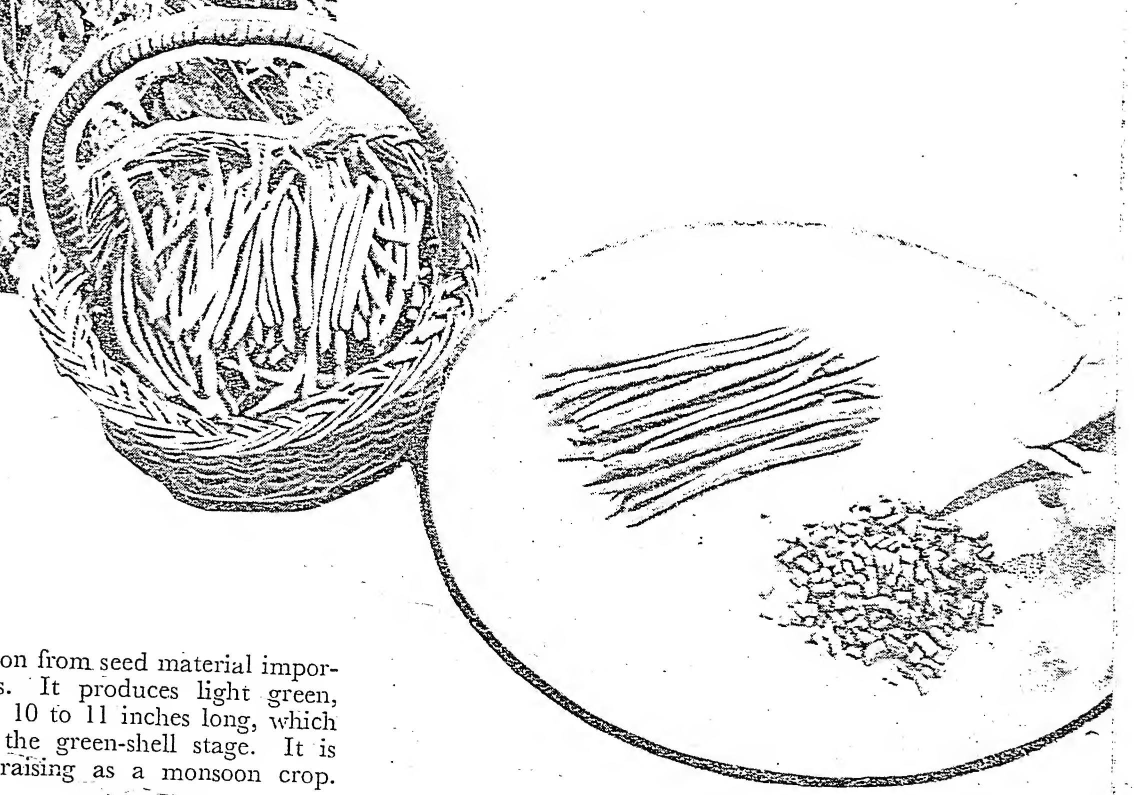
by

H. SINGH and S.M. SIKKA

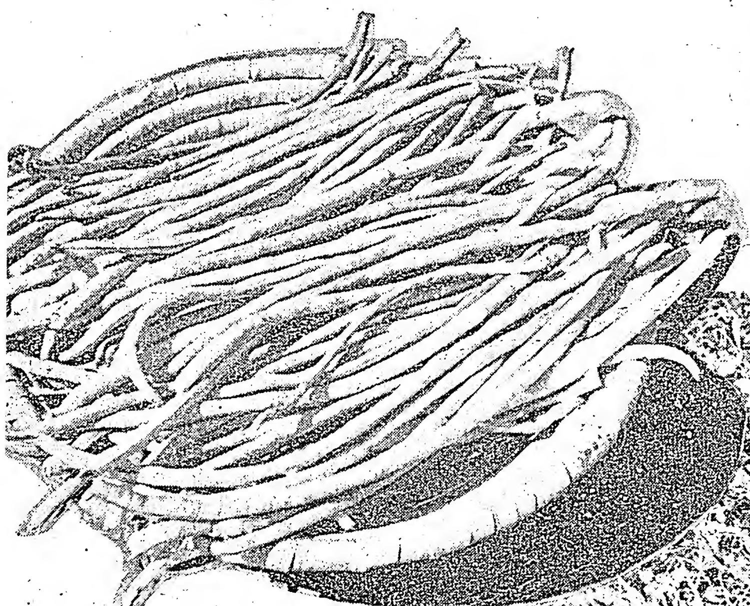
TWO new varieties of cowpea, recently selected at the Indian Agricultural Research Institute, New Delhi from a large collection of cowpea varieties procured from various parts of the country as well as from abroad, have been seen to have outstanding merit. They are *Pusa Phalguni* and *Pusa Barsati.*

Pusa Phalguni has been selected from the type 'Dolique Du Tonkin' from Canada and is specially suited for the February-March sowing. It has a dwarf, bushy habit and fruits profusely during the hot summer months. The dark green pods of this variety which grow erect and measure about five inches in length, are ready for picking in about 60 days after sowing. Usually, there are two flushes of fruiting under optimum conditions of growth. Under good average conditions, this variety has given about 100 maunds of green pods per acre in 100 days. It is a white-seeded variety with rather small, cylindrical seeds which can be used for cooking as a pulse.





A seed crop and attractive pods of Pusa Phalguni



A seed crop of Pusa Barsati. *It is available for picking in 45 days*

Pusa Barsati is a selection from seed material imported from the Philippines. It produces light green, cylindrical, pendant pods, 10 to 11 inches long, which are excellent for use in the green-shell stage. It is particularly suitable for raising as a monsoon crop.

Earliness is the special characteristic of this variety. If sown at the proper time (mid-June), it starts flowering within 35 days and green pods become available in another 10 days. The fully developed green beans, which are fairly bold in size, can be shelled out and used as a vegetable separately. An average crop of this variety can yield about 90 maunds of green pods per acre in 75 days. Like *Pusa Phalguni*, this variety also produces two and sometimes three flushes of pods. This variety has done particularly well in Delhi, the Punjab, Uttar Pradesh, Madhya Pradesh and even in some places in the South.

The cowpea, variously named as *lobia, rawan, barbatti, chaula* or *chowlee*, is a multipurpose warm season crop commonly cultivated almost all over India. While it is considered more useful as a fodder and pulse crop, it is also important for its green tender pods, which when properly cooked make a tasty vegetable dish. Cowpea, which grows easily in the plains, is considered a counterpart of the French or Kidney Bean (*farashbean*), which is more commonly grown as a summer crop in the hills or as a winter crop in parts of the States of Bombay, Hyderabad and Mysore. In Indian cookery, the cowpea pods are used in the same manner as those of the French Bean.

In the plains, especially in northern India, there are two main cropping seasons for vegetable cowpeas. The summer crop is generally sown towards the close of February and the sowing can be continued till the middle of April. The sowing for the monsoon crop commences from about the middle of June and extends up to the end of July. In the hills, this crop is sown during April-May.

The green tender pods of almost all types of cowpea can be used for human consumption. There are, however, special varieties for vegetable purposes. These varieties are usually characterized by long, round pods with rather sparsely-placed cylindrical or kidney-shaped beans. The asparagus or the 'yard-long'

variety, which produces two to three feet long pods, is a typical member of this group.

Like some other vegetables, cowpea varieties respond differently to various climatic conditions particularly with regard to temperature and humidity. It is, therefore, necessary to select the right variety for a particular season.

PREPARATION OF LAND

Pusa Phalguni and *Pusa Barsati* would grow well on all types of well drained soils though good results can be achieved on loamy soils. The February-March sowings can be done in fields which have been cleared of early winter vegetables. The stubbles and other residue of the previous crop should be picked as far as possible to have a clean, smooth seed-bed. For preparing a proper seed-bed, two to three ploughings should be given after applying eight to ten cartloads of farmyard manure per acre.

About a week before the sowing time, the field should be given a light irrigation. When it is in a workable condition, a mixture of 75 pounds of ammonium sulphate and 150 pounds of superphosphate per acre should be applied and the field prepared to a fine tilth. It is not advisable to apply higher doses of the fertilizer than this unless the conditions specially demand it. The land for the rainy season crop is also prepared and manured in the same manner.

SOWING

The seeds can be sown on flat or raised seed-beds. In the former case, the sowing can be done with a country plough, keeping a spacing of $1\frac{1}{4}$ and $1\frac{1}{2}$ feet between the rows for *Pusa Phalguni* and *Pusa Barsati*, respectively. The seeds should be so dropped in the furrow that after making an allowance for the failure of the seeds to germinate and seedling casualties, the plants finally stand four to six inches apart in the rows.

If the sowing is to be done on raised beds they should be made $2\frac{1}{2}$ feet wide with a spade, keeping one foot wide channels between the successive beds for irrigation. This system saves irrigation water in the summer crop which has to be irrigated very frequently, and also saves the plants from being submerged during a heavy rainfall.

At the spacings recommended, about 10 to 12 pounds of the seed in case of *Pusa Phalguni* and 15 to 17 pounds in case of *Pusa Barsati*, would be sufficient to sow an acre of land.

AFTER-CARE

The summer crop would need irrigation once a week during March and April and later on every fourth or fifth day. The early-sown rainy season crop would need one or two irrigations in the premonsoon period. The number of subsequent irrigations to this crop would be mainly determined by the quantity and distribution of rainfall. Two to three weedings and hoeings would be required to check the weed growth.

HARVESTING

It is very desirable that the pods are picked when they are tender. The cowpea pods develop very quickly, and if not picked at the right stage, they tend to become 'puffy.' Unlike peas, picking of green pods in cowpea has to be done more frequently.

SEED PRODUCTION

Like peas and beans, the cowpea also is a self-pollinated crop. As such, maintenance of purity of the seed is an easy matter. However, a certain amount of natural crossing has sometimes been observed to take place. It is, therefore, desirable that in case more than one variety are grown, the seed crop is carefully rogued, first at the flowering time and again when the pods have ripened. Off-type seeds can also be separated when the seeds are cleaned and graded for storage.

A good crop of *Pusa Phalguni* would produce from 8 to 10 maunds of seed per acre. The per-acre yield of seed in case of *Pusa Barsati* varies from 10 to 12 maunds. The pods of both these varieties do not shatter on ripening. It is, therefore, possible to wait till most of the pods have ripened and harvest the whole crop in one lot.

It is very important that the seed crop of the monsoon variety is sown towards the end of July, as the mature pods of the early-sown crop sometimes get badly damaged by continuous rains during the month of August.

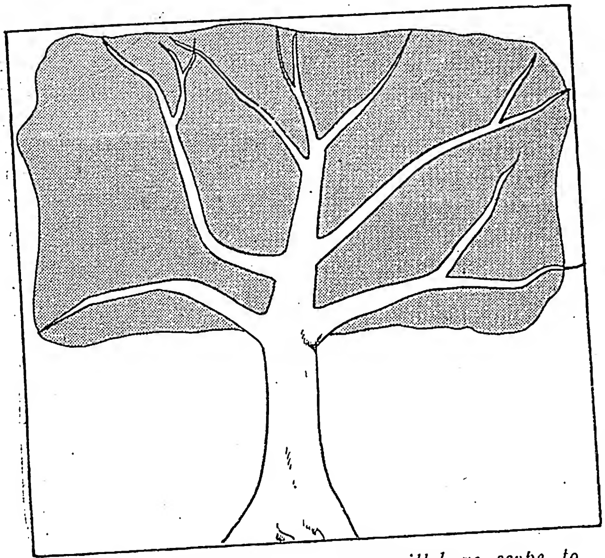
PESTS AND DISEASES

The spring-sown crop is liable to be attacked by aphids when the weather starts warming up. Frequent applications of nicotine either in spray or dust form, or of tobacco decoction (stock solution diluted to six times) will control the pest. Flea beetles also attack and puncture the leaves, especially in the early stages of growth of the crop. These are controlled by dusting the crop with two per cent D.D.T. at the rate of 10 to 20 pounds of D.D.T. for an acre, depending upon the age of the plants.

The cowpea seed, especially of the *Pusa Barsati* variety, when stored is very much damaged by the cowpea weevil. To check this, it is necessary to treat the seed before storing with 10 per cent D.D.T. at the rate of one ounce per 62.5 pounds of the seed.

No serious fungal diseases have yet been observed in the cowpea crop at Delhi.

The worst thing that you can do is to plant it like a jungle



Given normal distance, the tree will have scope to spread like this

WELL-SPACED TREES PERFORM WELL

by S. L. KATYAL

WHEN you have selected a suitable site and have prepared the land, the next step would be to plant young trees in your orchard. This may seem quite simple, but don't forget that it has to be done very carefully and in a preplanned manner. Haphazard planting of trees or planting them at too close a distance is a wasteful and uneconomical practice, and will produce nothing but a jungle. Trees planted too closely tend to grow upwards in search of light, thereby reducing their surface area for fruit development. Even for its aesthetic look, one should plant the trees in an orchard according to some set system.

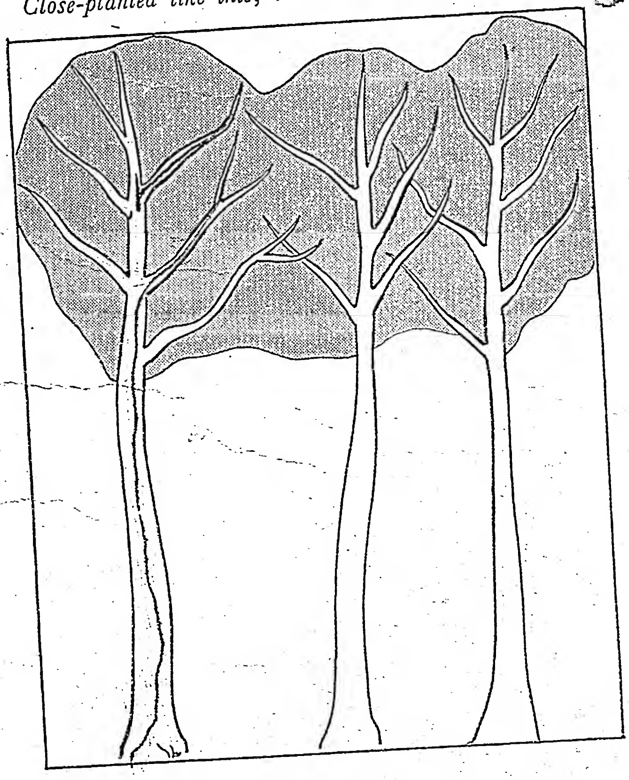
There are four chief systems of planting in an orchard: Square, Triangular or Hexagonal, Quincux or Diagonal and Contour.

SQUARE SYSTEM

In the square system, the trees are planted on each corner of a square, whatever the planting distance may be. This is the most common method, as it is easy to lay out and intercropping is possible in two directions.

Supposing ABCD is the field where the trees are to be planted. Mark out a line A′ B′ parallel to an existing boundary line or road to serve as the base line. Taking 20 feet to be the distance to be kept between the plants, the corner tree is located at one end of this base line (B′) and a stake is put at that point. At both the ends of the base line, right angles are drawn in order to lay out the orchard squarely on the base. The right angles can be easily drawn by following the simple carpenter's 3, 4, 5 foot system. This is done by measuring 30 feet from B′ toward A′, the intersection of a 50 feet arch from this point and a 40 feet arch from B′ giving the right angle for establishing one of the outside rows of stakes. By following this method, the outside rows of trees (A′ B′, B′ D′, D′ C′ and C′ A′)

Close-planted like this, the trees will not fare well



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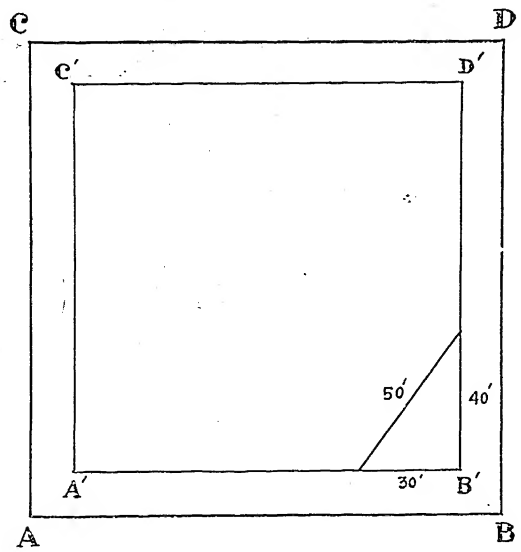
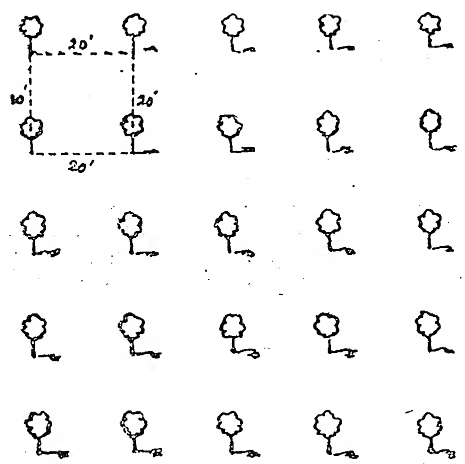
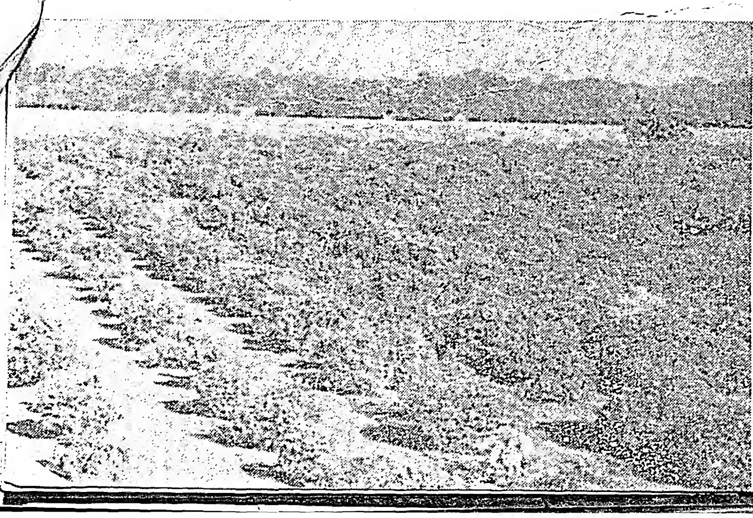


Method of getting lines at right angle to the base line in the Square System



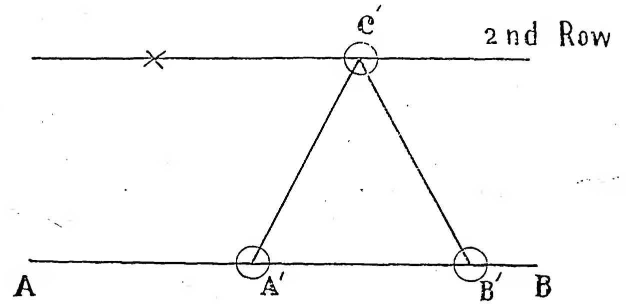
Planting by the Square System (above) and a young orchard of grapefruit planted by the Square System (below)



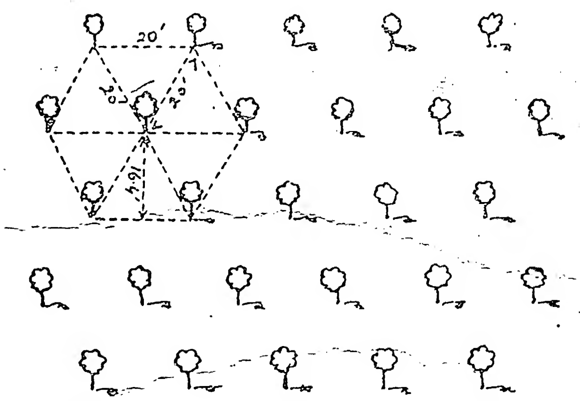
are established. The rows are then measured off at the required tree distances and the stakes set in.

TRIANGULAR SYSTEM

By the triangular or hexagonal system the trees are planted in each corner of an equilateral triangle. In this system, six trees form a hexagon with the seventh tree in the centre. Fifteen per cent more trees per acre can be planted by this system than by the square system. As such, this system can be usefully employed where land is expensive and very fertile, with a good supply of water. Supposing the planting distance is kept at 20 feet, by the square system the number of trees planted per acre will be 109, and by the triangular system 125.



Locating the tree in the second row in the Triangular System



Triangular or Hexagonal System of planting

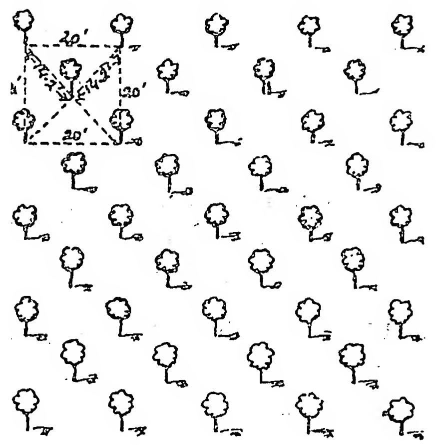
In this system, a base line (AB) is set on one side of the field as in the square system. Then a large triangle with a ring in each corner is made of a heavy wire or chain. The length of the sides of this triangle should be equal to the required distance. Two of these rings are placed on the stakes of the base line. The chain is then stretched. The position of the third ring determines the position of a tree in the second row. After the stakes are set in the second row, this row is then used as a base line and the stakes are set in the

third row. Then by using each row as a base line, the whole area can be laid out.

QUINCUX SYSTEM

The quincux or diagonal system is derived from the square system by planting an additional tree in the centre of each square. The central tree is usually a filler tree. Filler trees of a short duration, such as papaya, guava, banana, etc., can be planted in a young mango or citrus orchard. When the permanent trees become five or six years old, the filler trees can be removed. The number of trees which can be planted by this method is almost double than that in the square system.

Quincux or Diagonal System of planting



CONTOUR SYSTEM

On gentle and high slopes, contour planting is the best. In this case, the tree rows are planted along a uniform slope, usually at right angles, with the idea of reducing loss of topsoil due to soil erosion. A line should be drawn from top to bottom of the land and the stakes put in accordance with the contour at regular distances as in the square system. The work should start at the bottom and proceed towards the higher area.

PLANTING DISTANCE

The planting distance varies with the variety of fruit grown. Factors such as the likely tree size at maturity, soil fertility, type of soil and availability of irrigation water or rainfall have to be considered in deciding the planting distance. The planting distances recommended for different fruit trees are given below:

Name of fruit	*Planting distance*
Banana, papaya and grapevine	8 to 10 feet
Guava, loquat, persimmon, cherry and plum	15 to 25 ,,
Citrus, peach, apple, litchi and almond	20 to 25 ,,
Ber (grafted), mulberry and *jaman*	25 to 30 ,,
Mango (grafted) and *ber* seedlings	30 to 35 ,,
Walnut and fig	35 to 40 ,,
Mango seedlings	40 to 50 ,,

Number of trees per acre. To find out the number of trees per acre with any given distance, multiply the distance between the rows by the distance between the trees in the row, and divide the number of square feet in an acre, i.e., 43,560 by that product. For instance, *malta* orange at 20 feet by 20 feet will be 43,560÷400 or 109.

Approximately, the total number of trees to the acre at varying distances by different systems of planting will be as below:

Planting distance	*Square system*	*Triangular system*	*Quincux system*
10 feet	435	500	870
18 ,,	134	154	268
20 ,,	109	125	218
22 ,,	90	103	180
25 ,,	69	79	138
30 ,,	48	55	96
35 ,,	35	40	70
40 ,,	27	31	54

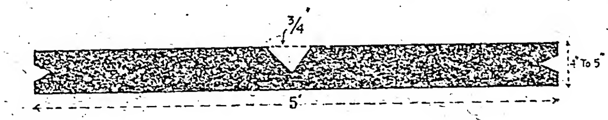
PLANTING

The fruit trees can be planted in February-March and July-August. Where irrigation facilities are available, the best planting time would be during February-March, as then the roots of the fruit trees would have established themselves, and when the rains come they would thrive very well. This time is also suitable for all deciduous types of trees (those that drop their foliage in winter). July-August is also a suitable period for planting evergreen fruit trees. The best time would be when the soil gets cooled down two or three weeks after the rains have begun in July.

Digging the pits. Pits 3 ft. × 3 ft. × 3 ft. should be dug in early summer and just before the rains. Well rotten farmyard manure should then be mixed with the topsoil of the pits in the proportion of one part of manure and three parts of soil. The plants should be dug out from the nursery very carefully with a fairly big ball of earth, and then set in the field in such a way that they remain slightly above the level they were in the nursery. As the soil around the plant slowly settles down, the plant will be at the same level as it was in the nursery.

TRANSPLANTING

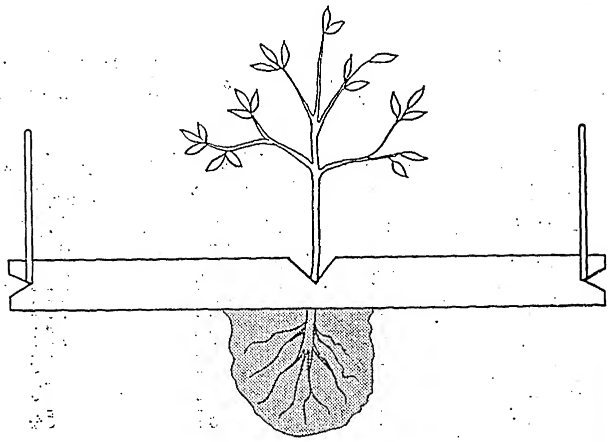
After locating the exact position of the orchard trees, it is important that the trees are planted exactly where the stakes stood. It can be easily done with the help of a planting board. This is a plain wooden



A planting board

board about five feet long, four or five inches wide and 3/4 inch thick, with a V-shaped notch cut in the centre and at each end. The central notch should be about 1¼ inches wide at the wide end.

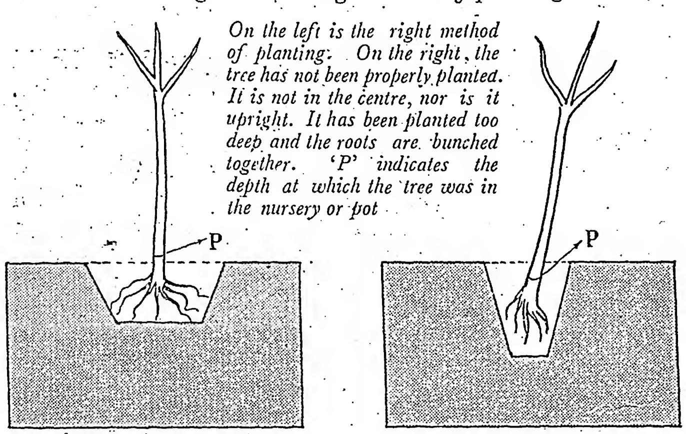
When digging holes for planting the trees, the planting board is placed with the central V-shaped notch round the stake. Two thin and straight sticks are then stuck in the ground in the two notches at both the ends of the planting board.



Plant set by the planting board

The planting board is then taken away, the stick marking the site removed and the tree hole dug out to the required dimensions, care being taken to leave intact the two end-sticks. When planting the tree, the planting board should be kept in the same position and the stem of the plant should fit in the central notch. The tree will then automatically come in the right position.

Right and wrong methods of planting



On the left is the right method of planting. On the right, the tree has not been properly planted. It is not in the centre, nor is it upright. It has been planted too deep and the roots are bunched together. 'P' indicates the depth at which the tree was in the nursery or pot

The mixture of the topsoil and farmyard manure is then put in the hole, and tamped with the feet so that the tree is held in position and no air pockets are left. The planting board is then removed and the balance of the soil is added and tamped thoroughly. It is advisable to leave two to three inches of soil put up around the tree trunk, so the irrigation water does not touch the tree.

The tree should be irrigated soon after planting, so that the dirt settles down and the soil against the tree roots becomes firm. A basin, somewhat bigger than the hole dug, should be made around the tree. The second irrigation should be given after a week or so.

THE EDITOR

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Rice-growing in the U.S.A.

by P. C. Raheja

THE average rice-yield in the U.S.A. is pretty high, 28·8 maunds per acre, as compared with the Indian average of 11 maunds. This is mainly attributable to mechanical cultivation, use of improved varieties, heavy fertilization and effective control of weeds, insect pests and diseases.

Rice in the U.S.A. is chiefly grown in northern California and the southern States of Arkansas, Louisiana, Mississippi and Texas. The total area under the crop in all these five states is nearly 1.90 million acres.

In northern California, water-planting of rice is usually practised. Heavy soils with an impervious subsoil layer of clay are preferred for this purpose in this type of cultivation. This method has three advantages: it keeps the growth of water grass, a competing weed, in check; the crop is less subject to temperature changes in its early growth period; and the cost of preparing the seed-bed is low.

The land is ploughed four to six inches deep after the winter showers. This is followed by discing and harrowing. All subsequent operations are carried out after the land has completely dried.

Where the land is rough, a drag is often used. The bunds or levees are prepared with a diker or a bulldozer on the contour of the field. The size of the bund varies with the slope of the land and the field area. The land is then levelled up with a land plane and water is let into the field. The flow of irrigation water is regulated by two irrigation boxes placed at the two diagonal ends of the field according to the size of the field and the availability of labour to control the irrigation.

The seeding is done immediately after this, from mid-April to mid-May, as otherwise germination may be adversely affected due to lack of aeration. The seeding is done by aeroplanes in standing water, about three inches deep. The seed is presoaked in water and pretreated with 'Agrosan G.N.' The presoaking is done for 36 to 45 hours in bags from which wateris drained out after 24 hours. The usual seed-rate is 150 pounds for an acre, which is increased on poor lands.

Dry sowing of rice is the common practice in the States of Texas, Arkansas, Louisiana and Mississippi, which are the chief rice-producing areas. Rice here is grown on a wide variety of soils from fine sandy loam to clays. Normally, these soils have an impervious subsoil through which seepage is very small.

The land is ploughed up to six inches immediately after the preceding rice crop or after the summer pasture. Discing is done in January or February, which is followed by harrowing and floating. After the bunds have been set up, the land is levelled. Rice is then drilled in the soil. If the moisture in the soil is insufficient, rice is drilled shallow and flushed with irrigation immediately thereafter. To control the grasses and other weeds, pre-emergence weedicides are commonly used.

In California, the chief rice crop consists of short-grained varieties of a duration of 145 to 160 days. The rice lands are cultivated with short-duration varieties of about 140 days. Sixty-four per cent of the area under rice in the southern states is grown with long-grained varieties, 32 per cent with medium-grained ones and only 0.9 per cent with short-grained varieties.

FERTILIZATION PRACTICES

Rice is universally fertilized in the U.S.A. except where clover is turned under to supply nutrients to the crop. In California, nitrogen in the form of ammonium sulphate has evoked good response. The optimum dose per acre is about 150 pounds which gives an additional paddy yield of about 10 maunds. The dose may be increased to 250 pounds, if the yield is persistently low. Ammonium sulphate is normally applied when the crop is 30 days old to give it a good start. The fertilizer is applied by aeroplanes and the depth of the water is kept up during the process.

In the southern states, the soils are deficient both in organic matter and nitrogen. In Louisiana and Texas, the common practice is to grow one or two crops of rice and then pasture the land for one to three years before using it for paddy again. This makes up for organic matter. In Arkansas, the land is left fallow or put under oat, soyabean or *Lespedeza*. In Louisiana, 300 pounds per acre of 6-9-6, 8-8-8 or 6-10-4 grade is drilled with the seed or 2½ inches below the seed. The latter practice has been found to give better results. A topdressing of 100 to 150 pounds of ammonium sulphate at the flowering time materially increases the yield. In Texas, 400 pounds of ammonium sulphate, or if the land is deficient in phosphorus, a mixture of 400 pounds of ammonium sulphate and 100 pounds of triple superphosphate is applied at the seeding time. This dose is halved on a light sandy soil. In Arkansas, 500 pounds of complete fertilizer 4-8-4 is applied at the seeding time. A topdressing of 200 pounds of

ammonium sulphate is often given after 30 to 40 days of sowing.

IRRIGATION

In all the rice-growing tracts, rice is raised as an irrigated crop. The highest yields are obtained in the water-planted rice. The depth of water in water-planting is three inches to start with. This is raised from five to seven inches during the fast-growing season. The water is withdrawn when the crop has matured to facilitate harvesting by machines.

Where the dry-planting method is followed, irrigations are given at short intervals of seven to ten days, up to 40 days. Then the levels are set up by means of boxes and the water is let in and allowed to stand to a depth of one to two inches when the seedlings are four to six inches high. The depth of water is slowly raised to five to six inches as soon as the seedlings are six to twelve inches high. After 45 to 50 days, the water is withdrawn for a week. This helps kill the water weeds and provide aeration. By then, the panicles begin to emerge and the water is again let in and a depth of six inches is maintained right up to the harvesting time. To facilitate harvesting with machines, the water is drained out about two weeks before the harvest.

HARVESTING

The harvesting is done by means of harvester-threshers or combines. Harvesting at the time when the grain has approximately 20 to 27 per cent moisture or is about 3/4th dry, has given the best milling quality grain with the minimum breakage. The threshed grain is transported to the milling yards in self-propelled conveyors or trucks. Rice is dried in dryers varying in capacity from 3 to 25 tons per hour. Sac-drying is also done in certain units. Rice is dried to 14 per cent moisture.

The old practice of burning the straw in the field has been abandoned, as the farmers are finding it more useful as well as economical to turn under the straw in the field and allow it to decompose.

WEED CONTROL

In California, the worst weeds of rice are the water grasses. But, as they are slower to germinate in the initial stages than the rice seedlings in water-planted rice, they are effectively controlled by keeping them submerged. Some other less serious weeds are also kept under check by keeping the field submerged up to a level of five to six inches and spraying the field with weed killers after the rice seedlings are well established. Use is also made of 2,4-D at the rate of $1\frac{1}{2}$ pounds for an acre, for controlling certain obnoxious water plants such as the water plantain or water lily (*Alisma plantago*) and the water hyssop (*Bacopa rotundifolia*).

In the southern states, where rice is dry-planted, weeds are generally controlled by frequent cultivations and timely irrigation. The broad-leaved weeds are commonly controlled by spraying 2,4-D at the rate of $1\frac{1}{2}$ pounds in 50 gallons of water.

PESTS AND DISEASES

In California, copper sulphate dust at the rate of 10 pounds for an acre is applied to control the most serious rice pest tadpole shrimp (*Apus oryzaphague*) and the water is drained away from the fields to eliminate the water scavenger beetle (*Hydrous triangularis*).

In the southern states, 10 per cent B.H.C. is used to control the bugs, borers and weevils. The draining away of water and burning of rice stubble is also common. Fungicidal treatments are given to the crops to control serious diseases of rice, but greater emphasis is laid on the breeding and use of disease-resistant varieties particularly blast-resistant varieties, for blast is quite serious at times.

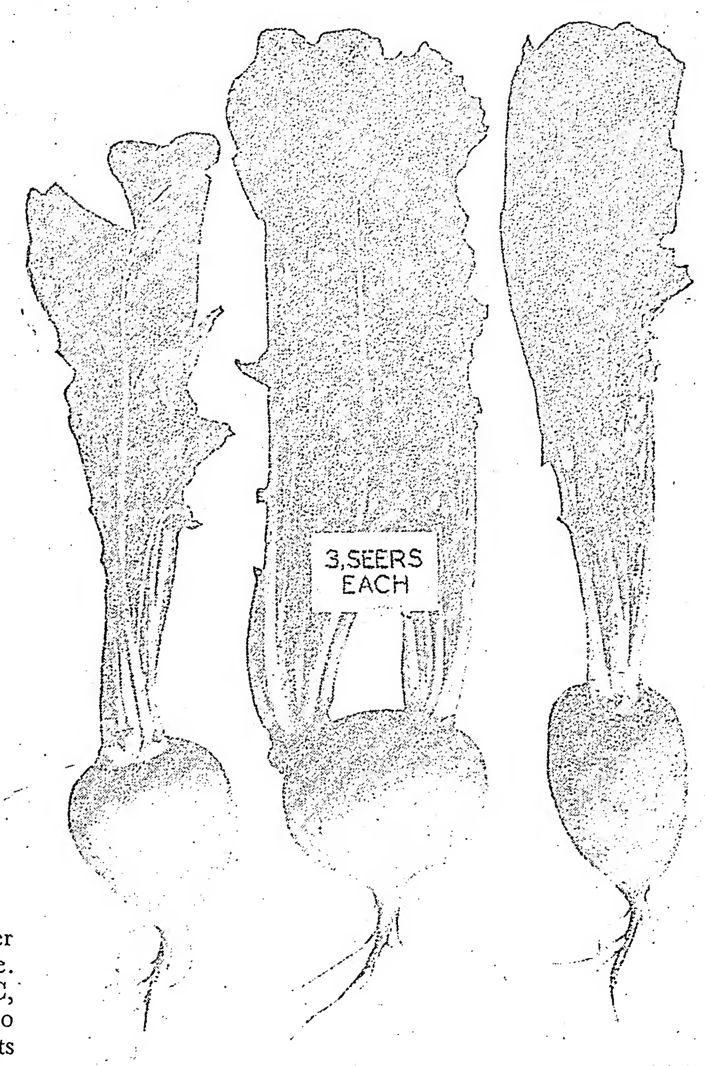
STORAGE

Rice in the U.S.A. is generally cultivated on large estates and seldom by small farmers. Immediately after threshing, the grain is moved to the rice mills, warehouses or shipping points as paddy. The means of transport employed is rice-conveyors or trucks which carry from 200 to 300 bags at a time. On the farm, rice is stored in bins. Elevators have been set up near the rice mills for bulk storage. Co-operative milling plants have now been set up alongside privately owned ones. In all types of storage, pre-fumigation of the warehouses, etc., is essentially done to reduce insect damage to the minimum. Most of the stored rice is sold in bulk when the prices are attractive.

Turnips are not only nutritious food, but grown well, bring in pretty profits too

make profits from turnips

by Romesh Chandra



TURNIPS are mainly grown for their tender roots which find common use as a vegetable. They are a good source of vitamins A and C, calcium, iron and phosphorus. The turnip leaves too have a high nutritive value, even higher than the roots and deserve to be popularised as a *sag*. An idea of the comparative nutritive values of the turnip roots and leaves may be had from the following:

	Turnip roots	*Turnip leaves*
Calories	136	140
Proteins (gm.)	4·3	11·0
Calcium (mg.)	158	987
Phosphorus (mg.)	134	190
Iron (mg.)	2·0	9·1
Vitamin A (International Units)	20	36,370
Vitamin C (mg.)	113	518
Thiamin (gm.)	0·26	0·37
Fat (gm.)	0·8	1·5
Carbohydrates (gm.)	28·0	20·6
Water (per cent)	87	84

The turnip (*Brassica rapa*, L.) belongs to the family *Cruciferae* to which also belong some of the important vegetables like broccoli, brussels sprout, cabbage (*bundh gobhi*), cauliflower, garden cress (*ganth gobhi*) kohl rabi, radish and *sag sarson*. It was even known to the Greeks and Romans as a vegetable and as a forage crop. It is believed that the turnip was first grown in Britain or Northern Europe. It has since been extensively grown in India as a vegetable and as a forage crop especially for milch cattle. In fact, it is the only fodder available during December.

The turnip thrives on a wide range of soils, but is at its best on a rich and well manured loam. It can also be successfully grown on a sandy loam provided the soil is well manured. It is primarily a *rabi* crop as it cannot tolerate either the summer heat or extreme cold of the winter. It remains edible for such a short time that successive sowings of small areas have to be taken up at 15 to 20 days' intervals.

Several turnip varieties are grown in India, but the most important among them are the *Delhi* local, *Early Snow Ball*, *Golden Ball* and the *Purple Top White Globe*. A comparative study of these four varieties conducted at the Indian Agricultural Research Institute, New Delhi, from 1950 to 1953 revealed that except the *Delhi* local, all the other varieties are of a uniform size, shape and colour and have a good flavour and taste, and are popular with the farmers. As regards yield, the *Purple Top White Globe* and *Golden Ball* outbeat the other two varieties. Individually,

the various varieties possess the following characteristics:

Delhi. This is an early ripening, somewhat hardy variety of an irregular shape, but yields roots of a reasonably marketable size. The average per-acre yield of this variety is 210 maunds.

Early Snow Ball. This is also an early variety of a pure white colour and medium size roots, and is suitable for bunding. It takes about 50 days to ripen. The average per-acre yield is 232 maunds.

Purple Top White Globe. This is a very soft variety and as the name implies, with a purple top on a white body. This is a mid-season variety of a fairly large size and is quite suitable for pickling and dehydration. It is also suitable for bunching and topping, ripens in about 60 days and can be stored for a long period. The average yield per acre is 333 maunds.

Golden Ball. This variety has a beautiful golden colour and the roots are of a fairly large size. It is a late variety and takes about 70 days to develop a suitable size. The average per-acre yield is 343 maunds.

SOWING

The land is first ploughed with a soil-inverting plough. It is then worked with a clod crusher or a heavy wooden roller to break the clods completely. A *desi* plough or a cultivator is then run at least six times in order to obtain a fine tilth.

Fifteen to twenty cartloads of farmyard manure is ploughed in in the field at least one month before sowing. Ammonium sulphate (one maund), superphosphate (two maunds) and sulphate of potash (half a maund) are then applied to one acre of land in two equal doses, first at the time of sowing and the second, four weeks after sowing.

In the plains, the crop is generally sown in September-October, but late sowings can also be done till the end of December. In the hills, the turnip is sown in August-September. The growing season can well be extended by adopting successional sowings.

Turnips are generally sown on ridges $1\frac{1}{2}$ to 2 feet apart, and the seed is thinly dibbled about $1\frac{1}{2}$ inches deep on both sides of the ridges. When the crop is about one inch high, the plants are thinned out of six to nine inches space. The plants thus uprooted can be transplanted in another field. If these are planted thick in the row, small turnips are produced which can also be sold in bunches along with green tops.

The spacing between the rows and the plants in the row also depends on the type of soil on which the crop is grown. On a poor sandy soil, closer planting should be done, whereas on rich loam, well manured and irrigated soils, a wider spacing should be given.

For vegetable purposes, when sown on ridges, two to three pounds of seed is sufficient to sow an acre. In case turnips are to be grown broadcast for fodder, about five pounds of seed would be necessary. The turnip seeds readily lose their viability if they are continuously exposed to moist climate or kept over a long period. It is always better to use fresh seed for getting a better stand of the crop.

AFTER-CARE

Thinning is essential to get a good crop of turnips. It is done when the plants are about one inch tall and the first set of leaves, which are usually rough, is formed. Hoeing is done after every irrigation in the early stages to remove the weeds. The turnip crop requires four to five irrigations depending upon the season.

Turnips are ready for consumption when the roots are of the size of a hockey ball. Afterwards, they become fibrous, hollow and pithy and are unfit for human consumption.

ECONOMICS OF TURNIP CULTIVATION

The cost of raising one acre of turnips and the possible income as worked out at the Institute are given below:

Expenses	Rs.	a.	p.
Preparatory tillage (cost of six ploughings and three plankings at Rs. 7-2-0 per day)	48	0	0
Manure, 20 cartloads at Rs. 5 per cart	100	0	0
Cost of fertilizers (ammonium sulphate, superphosphate and sulphate of potash)	56	0	0
Cost of two pounds seed at Rs. 10 per pound	20	0	0
Preparation of ridges with 'Victory' plough at Rs. 7-2-0 per day	7	2	0
One labourer for dressing by rake at Rs. 2 per day	2	0	0
Dibbling of seed by four men, per acre per day at Rs. 2 per man	8	0	0
Cost of weeding by eight men at Rs. 2 per day (three weedings)	48	0	0
Labour charges for irrigation, six working days at Rs. 2 per day	12	0	0
Harvesting, eight men per day for one acre at Rs. 2 per day	16	0	0
Irrigation charges per acre	4	4	0
Rent of the land	100	0	0
Total	421	6	0
	or 420 (round)		
Income			
Gross income by sale of 250 maunds of roots per acre at Rs. 4 per maund	1,000	0	0
Net profit per acre	580	0	0

SEED PRODUCTION

Generally, the turnip seeds are produced in the hills with the exception of the local types which produce

seeds in the plains. Only healthy and vigorous plants should be selected for seed production and sufficient area should be provided for proper root development by thinning out the crowded plants. However, it may not be advisable to occupy the whole area for a few plants selected for seed production. The selected plants are, therefore, generally taken out from the field and transplanted in a well prepared and well manured bed. About one third of the roots are cut at the bottom and the leaves are topped up to a height of three to four inches. The plants are now two feet apart and the space between the rows is three feet. The plants should be irrigated soon after transplanting. Subsequent irrigations are given at intervals of a week or ten days, depending upon the season and the type of soil. The seed is ready in about 120 days from the date of transplanting.

INSECT PESTS AND DISEASES

Fortunately, the turnip is not attacked seriously by any disease in this country.

Some insect pests like the mustard aphis, mustard sawfly, flea beetle and the painted bug often seriously damage the crop. For getting satisfactory yields, it is necessary to control these pests effectively.

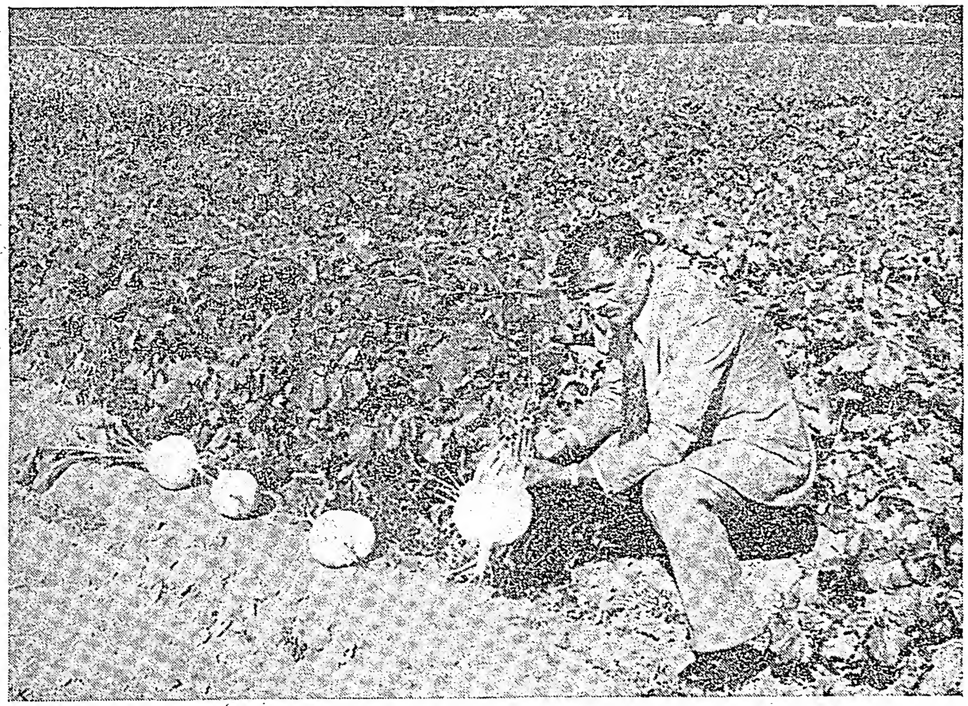
To keep the mustard aphis (*Rhopalosiphum pseudobrassicae*) in check, clean cultivation is necessary. All weeds growing in the vicinity should, therefore, be removed. The crop may be dusted with one to four per cent nicotine, 0·5 to 0·75 per cent 'rotenone' or 0·9 per cent pyrethrin in five parts of talc at the rate of 15 to 20 pounds for an acre in each case. Spraying with nicotine sulphate (40 per cent) 1 : 800 may also be done.

In case of the mustard saw-fly (*Athalia proxima*), the larvae may be handpicked in the morning and at dusk. The young seedlings may be sprayed with lead arsenate, one pound in 50 gallons of water. Dusting with three per cent B.H.C. is most effective in this case.

The flea beetle (*Phyllotreta cruciferae*) can be controlled by dusting with five to seven per cent B.H.C. or 'pyrodust' (4,000).

Clean cultivation with no weeds in the vicinity is also necessary for obviating an attack by the painted bug (*Bagrada cruciferarum*). The infested crop may be sprayed with soap solution, one pound in six gallons of water, to destroy the eggs and nymphs. Fish oil rosin soap solution, one pound in eight gallons of water at about 30 gallons per acre, can be used for destroying the eggs, nymphs and adults. Dusting with 0·1 to to 0·25 per cent B.H.C. is also effective. The fields where eggs or nymphs are hiding in crevices, may be irrigated with water mixed with crude oil emulsion from two to five pounds per acre, depending upon the degree of infestation.

A field of Purple Top White Globe *turnip—a popular variety*



S. 228-X52

MADE IN INDIA

Do you produce good ghee?

No

EVERY Indian home produces ghee either for consumption or for sale. This important food, however, suffers from serious drawbacks. It is badly produced and badly stored so that it gets spoiled and rancid, and loses much of its food value before it is consumed.

Dairy scientists have been studying the factors which spoil ghee and say that starting with milk, the entire process of ghee production and storage is very defective; that is why they say that the final value of ghee is very much less than what is should be. They recommend that the method of preparation and storage of ghee in the home should be so modified that the product may be hygienic and nutritive.

THE RIGHT WAY

What then is the right way of producing ghee? Let us begin with milk. Use of raw milk for preparing ghee accounts for nearly 50 per cent of the defects found in the ghee produced for home or for the market. Milk should be brought to boil and simmered for about five minutes. This will kill all bacteria which are responsible for spoiling ghee. The vessels used should be cleaned, and if mud pots are used they should be cleaned with mud and rinsed with water and sterilized by filling them three-fourths with water and bringing to boil, preferably with the lid on. Vessels not sterilized in this way harbour bacteria which spoil the milk.

The milk after cooling should be inoculated with a good starter (*dahi*). What makes a good starter? This can be seen by its consistency and flavour. A good starter will be of a solid consistency with a separation of a little whey at the top of the whole mass. A bad starter will not be a solid mass but will be in two layers—curd at the top and a thick layer at the bottom full of gass holes. Avoid such a starter.

Milk should not be kept in naked bronze or brass vessels. After the milk is cooled down, a little of the good quality starter should be added to it and the milk allowed to curdle. For preparing the starter, it is better not to use previous samples of *dahi* or buttermilk, but use a small quantity of *dahi* prepared in another vessel using only boiled milk. When adding such a culture, take care that it is compact and has an agreeable odour.

Allow the curd to stand for about 24 hours. Then churn it either in the same vessel or in another larger one with the desired amount of cleaned water. The paddle used for churning should be of good wood and should not contain any nails or other iron connections. Buttermilk absorbs small quantities of metals easily which will later affect the keeping quality of ghee.

Churning should be done in the shade and direct sunlight should be avoided. Butter should not be overchurned, and when ready should be given one or two washings with clean water. It is advisable to convert the butter into ghee at once. If for some reason this cannot be done, the butter should be dipped in clean cold water and preserved in a closed vessel. The water should be changed at least once a day. Do not store the butter for more than three days, and on no account keep it near the kitchen fire.

Melting butter first into *kacha* ghee should not be done because such a ghee contains a good quantity of buttermilk which will make the ghee go bad. Use clean vessels for melting butter. The stirrer should be of aluminium or of a tinned metal. In heating, do not raise the temperature too high or cool suddenly.

STORAGE

When transferring ghee to the vessels in which it is to be stored, do not allow the bottom liquid layer to pass. Ghee should be stored in tins, aluminium vessels, glazed pots, porcelain jars or tins and brass vessels with good lids. As far as possible, fill the vessels right to the top, so that there may be as little of air space as possible. Store it in a cool place.

When ghee is required for daily use, a quantity that lasts for three or four days should be taken out so that the bulk is not exposed to the air often.

Tin cans with rusty spots should not be used for storing ghee. Avoid such practices as plugging the ghee tins with raw banana leaves and wiping out ghee pans with old gunny bags or exposing the vessel to the sun to get as much of ghee sticking to it as possible, and adding such ghee to the fresh one.

These are some of the 'dos and don'ts', dairy scientists recommend to the housewife in the preparation of ghee. Any additional trouble taken in preparing ghee properly will be more than compensated by the fine quality ghee obtained.

READERS WRITE

MY WORD OF APPRECIATION

In the last couple of years, the transformation of "Indian Farming" has been a joy and delight to me......each number is full of interesting surprises..............every article is full of interesting information, written so that it is easy to read................I know that such excellent quality is not achieved without tireless effort on your part. I just want to add my word of appreciation to the many you must be receiving from your readers. —G.B.G.

PARA GRASS

The 'Para Grass' article (October 1954) interested me very much. This grass will be very useful for our area. —O.P.S.

INSTRUCTIVE

I am in appreciation of your January 1955 editorial. Your account of various recommendations is very invaluable and instructive to the practical farmer. The items described are simple and precise. —J.I.F.P.

I LIKE IT

We like "Indian Farming" for its 'Man of the Month' and 'Farmers I Have Met', and particularly for its original articles. —S.S.P.

A LOT OF IMPETUS

I get a lot of impetus by reading about farmers' activities in different parts of the country in "Indian Farming".—B.L.A.

IMPLEMENT FOR INTERCULTIVATION

Our soil being sandy, groundnut grows here well and far better than other crops, but we have no proper implement for interculture. Just after 10 days of sowing, intercultivation has to be given once or twice, otherwise, if delayed, the weeds grow faster and the crop is completely smothered. I have about 50 acres of groundnut. Can you suggest a bullock-driven cultivator that is suitable for this work? We harvest groundnut with a mould-board plough and find it economical than the traditional method of digging with a kodali.

—P.N.M.

It is highly advisable that you plant groundnut in straight rows. As far as possible, this will facilitate interculture with implements. You can select the 'Shabash Cultivator', 'Kanpur Cultivator', 'Akola Hoe' or 'McCormic Cultivator'.

(Continued from page 10)

The Committee also publishes a weekly report of market conditions, such as quantities marketed in each market, highest, lowest and average prices prevailing in the markets, quantities despatched and consumed internally, condition of standing crops and a forecast on price fluctuations and arrivals in the coming week. Daily notes containing information about quantities marketed in each market, prices, etc., are exchanged by Market Superintendents and these are put up on notice boards for the information of buyers and sellers.

The finances necessary for the functioning of the Committee are derived from a nominal levy of Rs. 0-1-6 per bag of kernels bought and sold in the District, licence fee charged for issuing licences to all premises in the Notified Area, weighmen and broker licence fees and other items of miscellaneous receipts, such as wear and tear charges on gunnies, auction sale of yard sweepings and income from the sale of cattle manure and road sweepings. These sources provide a total revenue of nearly two lakhs of rupees to the Committee, the annual expenditure being from Rs. 1,50,000 to 1,75,000.

(Continued from page 12)

parching. It has bold grains and is late in maturity, taking about 125 days to ripen. The average yield per acre is 500 pounds which is 40 per cent more than that of the local variety. It is suitable for growing in the Malwa plateau.

Ujjain 21. It is a selection from Sardarpur. It is a vigorous growing early maturing strain taking about 105 days to mature. The seeds are bold with a rough seedcoat, and yellowish brown in colour. It is suitable for growing in southern Madhya Bharat. The average yield per acre is 550 pounds which is 25 per cent more than that of the local variety.

Ujjain 24. It is a selection from Chanderi in the Guna district. It is a late maturing, heavy yielding strain, and takes about 120 days to ripen. The grains are small, having a smooth seedcoat, and light brown in colour. It is suitable for growing in southern Madhya Bharat. The average yield is 720 pounds per acre which is 60 per cent more than that of the local variety.

FARM FLASHES

About 10 million acres of land in India is under groundnut, producing 35 per cent of the total world groundnut production

* * * *

Field rats are responsible for an annual loss of about 44,56,687 maunds of foodgrains worth more than five crores of rupees in the Punjab State only

* * * *

Planting in deepened trenches and deep earthing up promote good girth in canes

* * * *

An average green manure crop adds from 8 to 10 tons of succulent organic matter to the soil

* * * *

Under favourable conditions, a papaya tree can live up to 10 years, its average life being eight years

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The Foot and Mouth disease attacks nearly 3·5 lakh animals every year in India

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The total poultry population of India is nearly 69,000,000; 50 per cent of them are lost every year due to disease, accident and attack from animals

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Coconut production in India can be raised by 50 per cent through adequate manuring and intercultivation

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